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WATERS OF WESTERN INDIA.

PART IV.—GUJARAT—(*continued.*)

(*By a Member of the Society.*)

THE seas of Gujarat, as has been shown above, resemble towards the south those of the Konkan; and northwards belong to the Sind maritime region, so I need spend no time or ink on them.

In the freshwaters, as hitherto, the only important mammal is the Otter (*Lutra nair*). In the matter of birds, the difference between these waters and those hitherto dealt with is very great. We have here got to the edge of the tropical region, and while we have nearly all its Indian forms, the cold weather brings us many of the Palæarctic birds.

Of the Aquatic Raptores, the chief is the Ring-tailed Sea Eagle, *Haliaeetus fulviventer* (*leucoryphus*), closely followed by the Osprey. The former certainly breeds here in the rains, but I have not found an Osprey's eyrie. The Ring-tailed Eagle preys at certain seasons at least as much on water-fowl as on fish, its chief victims the countless bald coots, being much inferior both on the wing and in the water to ducks, are a comparatively easy prey; and I have seen, on an island of the Nal, a space of many square yards strewn six inches deep with their feathers, around an old acacia which the eagles used as a dining room, or as falconers call it, a "block."

The Osprey, on the other hand, seldom touches feather.

The Brahminy Kite, a bird much less restricted in matters of diet than his human godfathers, is also abundant ; and *Spilornis cheela* is found in the eastern woodlands, often near water, but by no means confined to its neighbourhood. The birds of prey of this region seem to require a little more attention than they have hitherto received, but I do not myself think that they will be found to include any forms not found in either Khandesh or the desert region. I have not met with the grey-backed or the white-tailed Eagle on the freshwaters.

Limnaetus Cristatellus is not uncommon in Eastern Gujarat, but in spite of its watery name it is not a water eagle but essentially a forest bird.

One fish Owl (*Ketupa*) occurs in the eastern streams, probably in greater numbers than might be supposed from the scanty records as yet published.

The Great Blue Kingfisher. (*H. Leucocephalus*) haunts similar waters. The other two Blue Kingfishers (*H. Smyrnensis* and *Alcedo Bengalensis*) and the Pied Kingfisher (*Ceryle rudis*) abound, but the region is not generally favourable to the rarer species that belong to or approach the Malayan fauna.

Of Cranes we have three. The huge Sarus is a permanent resident, and a familiar object, as few people ever molest him. In one flock of these cranes which I had repeated opportunities of watching, there was a half-grown bird who used often, and of his own accord, to swim short distances. The common and demoiselle cranes are cold-weather visitors, coming in huge flocks, especially to the north-western plains. They roost in great numbers in certain marshes on the edge of the desert; and as they fly eastwards in the early morning over the cultivated lands, they seem like an aërial army with banners and trumpets. Each corps keeps clear of its neighbours, but the whole army advances almost in line, and sometimes the flanks are out of sight on each horizon. But the whole force seldom takes more than a few minutes to pass. These two species are eagerly pursued, but generally take very good care of themselves.

All the southern species of Plovers are abundant here. Of the more northern Vanellinæ (or Lapwings proper), *Chettusia gregaria*, the Black-sided Lapwing, occur in small flocks, and Captain Butler mentions the White-tailed Lapwing (*C. leucura*). Both the "Did-ye-do-its" are common; and both Stone Plovers occur in suitable places, and breed. For the certainty of this, in the case

of the Great Stone Plover, I am indebted to Mr. Littledale's paper in the fourth No. of this Journal. I have myself seen the bird all the year round in this region, under circumstances which induced me to believe it a native; but I have not got the nest. This is by no means my only obligation to Mr. Littledale and his collaborator, Mr. Doig.

The Turnstone, Crab-Plover, and Oyster-Catcher occur on the coast, and probably breed there.

The Snipes are the same as in the regions already treated of, "only more so," or at least more of them. The Woodcock Wood Snipe may occur in the Dangs.

The Black-tailed Godwit is common in the cold weather; its ally the Avoset Sandpiper, rather rare. Of the Curlews, the true curlew is commonest on the coast; the Whimbrel is far more so inland, and usurps its name in the sporting vocabulary of Gujarat. The Stints are numerous, especially on the coast. One species (*Tringa minuta*, I think,) is fairly abundant in sandy river beds, even of moderate size. For instance, I have found large flocks on the Wát-ak, near the famous tomb of the Sayads, above Mahmudabad. Small as they are, the Stints are well worth powder and shot, being, for the table, barely inferior even to Snipes. Sandpipers are very common; the Greenshanks and both Redshanks hardly less so. *Totanus calidris*, in a few places, occurs in immense flocks, especially towards evening, when scattered foraging parties unite, and fly towards a common roost.

On one occasion, finding out their path to bed, I shot in a few minutes enough to supply a large camp and might have killed many more. The Stilt is common, and the Avoset not rare in suitable places; but the great abundance of Ducks and Snipe causes the sportsmen of Gujarat to overlook almost all other water-fowl; and they really know less about them as a rule than the shikaris of less favoured lands, who are obliged by necessity to be less "proudful," and know something about eatable "Snippets."

Of the Latitores, both Jacanas are common, and both breed. The Rails and Water Hens are very numerous, and as yet by no means worked out. I have little reliable information about them myself. The Purple Coot and Bald Coot abound and breed. The former, as seen strutting on the grass near the edge of a tank, with the sun on its plumage, is a splendid bird, looking like a great blue pullet. In hand, its size shrinks, the plumage seems rather

sooty, and it is only second-rate as a table bird, and can take no rank in presence of so many better birds as we find here.

Of the *Culicrostres*, we have the great Adjutant and the handsome "Jabira" (*Mycteria*).

The European Stork is a winter visitor, the Black Stork rare, and, as elsewhere, confounded with the black White-necked Stork, which is very abundant.

The Herons are abundant. On one occasion I saw a bird which I took at the time for *Ardea sumatrana*, but the observation is doubtful. The grey Purple Herons, the various white Egrets, and the whole tribe of Paddy-birds, swarm in suitable places; the European Bittern is not uncommon in the cold weather and at least one little bittern still less so. Mr. Littledale mentions this as *A. flavicollis*, but it is probably not alone.

I have often seen various herons associated with crocodiles upon (apparently) the most friendly terms, and once a white Egret (*H. minor*) appeared actually to pick something off the reptile's side, probably a leech or some parasite.

The Spoon-bill is common, usually associated with the White Ibis. The Glossy Ibis occurs in considerable flocks; and the Black Ibis in smaller parties, but more frequently. This bird is here often a very foul feeder. The Pelican Ibis and Shell Ibis abound. The three last birds all perch on trees; but I have not seen the Glossy Ibis do so; and the White Ibis not often, except at night.

Of the true *Natatores*, the first is the Flamingo, which abounds in places in the cold weather, remaining as late (occasionally) as June. I have not, however, found it breeding. (Where *does* it breed?)

The typical Wild Goose, *A. anser*, occurs in the cold weather, especially in the north-western districts bordering on the desert region. The flocks are infrequent, and usually small, and the habits of the bird appears to be rather nocturnal, so it is but seldom shot. No other species of *Anser* (as restricted) has yet been recorded. The Nukta or Black-backed Goose (*Sarkidiomis melanonotus*) is common, and breeds. The other resident *Anatidæ* are the Lesser Whistling Teal, the Cotton Teal and the Spot-billed Duck. This last is commonly called in Gujarat a Mallard, and is, indeed, very closely allied to the European Mallard, which may perhaps occur in Gujarat as a rare straggler. I have not seen it there myself.

The Brahminy Duck is common enough, and stays late; but does not, I think, breed here. The Sheldrake (*Tadorna vulpanser*) is

rare. The Shoveller abounds, but is here little esteemed by sportsmen, because of its familiar habits. It may commonly be seen dabbling in dirty little puddles besides villages, almost as tame as the Pea-fowl, and not much more particular in its diet.

The Pink-headed Duck of Bengal probably does not occur. The Gadwall, Pin-tail and Wigeon are abundant; the last two in larger flocks, and more locally distributed than the first. The common Teal and Garganey abound, and the latter remains later than any other migrant duck, quite up to the end of April and even the beginning of May. The birds just named, with the Spot-billed Duck and White-eyed Pochard are the ducks most commonly found in the bag in Gujarat. I have shot the Marbled Teal in Gujarat and Kattywar, but it is a rare bird. The Red-crested and Red-headed Pochards both occur; but being powerful and wary birds, and affecting the wider waters, are less commonly shot. The Scaup may occur as a straggler, and the Tufted Pochard is locally common, especially towards the N.-W. Frontier.

The Merganser and Scaup are rare stragglers, as is the Crested Grebe. The Dabchick is common all over India wherever there is water. The Gulls and Terns, very abundant in some places, are the same as those of the Sind region, and are mostly recorded by Captain Butler. I am surprised, however, to find *S. javanica* not noted as a Gujarat bird in his list, as it is not uncommon on the Sabarmati or Ahmedabad river. I have not seen the Skimmer (*Rhynchops albicollis*), but I think it has been obtained on the large estuaries.

The Lesser White Pelican is not uncommon in the cold weather; and I think that the European Pelican will probably be found to occur at least as a straggler. The Grey Pelican is common, and breeds. The rivers of Gujarat sometimes flood very rapidly, a sort of wall of water pouring down the dry bed, and on the crest of this, or little behind it, amidst a confusion of drift and muddy foam, the Grey Pelican may often be seen, looking almost the spirit of the deluge.

The Great Cormorant is rare, the lesser and little Cormorants are common; and the last a permanent resident, as is the Snake Bird. Of all lands that I have shot in, Gujarat is the best for wild fowling in a modest way. The number and variety of birds is less than in many other places, but still sufficient to satisfy any reasonable sportsman. The multitude of tanks, and the great variety

in their size, enable a busy man to get a few brace of birds in an hour's walk with little apparatus and arrangement; and this to a resident sportsman is worth far more than the power of making a big bag at the cost of half-a-day, and of preparations made as if for a battle. The punt-gun is unknown, and the natives, luckily, know little, in most places, of snaring water-fowl.

The aquatic reptiles and amphibia of Gujarat differ so little from those of the provinces already dealt with, that no great notice of them is necessary. Crocodiles (*C. palustris*) and freshwater turtles abound. The Crocodiles eat the turtles and the turtles eat whatever they can get. Both attain a larger size in the great rivers than in the standing waters. The fishes, too, are much the same. I have not myself procured *Barbus tor*, the typical Mahseer in this province, nor in Khandesh, which, as far as river-fish go, is a part of Gujarat, though its water-fowl are those of the Deccan.

In those places in Gujarat where I have fished, the most sporting Barbel was, I think, *Barbus sarana*, called by the natives "Darai." I have also often got the "Kafria," a handsome fish, which I take to be identical with the Konkan Mahseer, and have somewhat doubtfully identified with *B. pinnauratus*.

In the same way the occurrence here of *Labeo rohita*, the true Roho or Rahu fish, is very doubtful. Its place seems to be taken by *Labeo calbasu* and two other species, which, I think, must be *L. fimbriatus* or *Leschenaultii*, and *L. ariza*; but I am not prepared to speak with certainty.

Of the sea-fishes there is little new to say, except that in this province you begin to get the Palla (*Clupea ilisha*) or Indian Shad running up the great rivers to spawn.

If, however, the fishes of Gujarat differ little from those of our southern waters in kind, they greatly exceed them in number. A great many tanks are protected by those communities (very powerful in Gujarat) which object to the destruction of life, and the weedy deeps of the lakes form natural sanctuaries. During the rains the flat and flooded country affords ample water-way to fry, and the open waters are restocked from these reserves.

In consequence the number of fish is everywhere very great, and the Labeos in particular attain a very large size, often exceeding twenty pounds in weight. There is scarcely any part of the province where one cannot get a little rod fishing of some kind; and in the more rapid parts of the great rivers it is sometimes really good.

Of freshwater crustacea the prawn is apparently identical with that of the Deccan and Konkan, but crabs are much less common here than in those provinces ; I do not know why.

To make up for this to the birds and fishes, some of the freshwater molluscs (gasteropods) occur in vast numbers in particular tanks and marshes, especially in the North-Western plains. The Unionidæ, however, are not abundant, apparently sticking chiefly to running water and open gravelly or sandy bottoms. Now few of the tanks have sandy bottoms, unless occasionally in some one corner end of the lakes; I think that the Nal of Viramgaum is the only one that is not marshy or weedy all round. Accordingly, I have found dead shells of a small *Unio* on its beach. In the eastern streams there seem to be the same two species as in the former provinces, but they do not abound.

During the hot weather the water of some tanks and lakes is affected, by some cause unknown to me (probably the liberation of gases from the mud), in such a manner that all kinds of fish rise and float gasping on the surface, and eventually die in great numbers. I have described this phenomenon, as witnessed by me on the Little Bokh (a lake of the Ahmedabad district), for the Report on the London Fisheries Exhibition. The fish that die are left to carrion fowl; but those only moribund are captured in great numbers, and eaten without any ill result. I have repeatedly eaten them myself, and found them in excellent condition. The cause of death appears to be asphyxia, and not specific poisoning. I have mislaid my notes, but to the best of my memory the Ophiocephali are not affected; neither is any aquatic reptile or insect. The prawns do not frequent the tanks, and I do not think that the "hot water," as the natives call it, is ever observed on any river. It is well known that many bottom fish can be much inconvenienced by the mere stirring up of the mud, as by the passage of cattle or elephants through a muddy stream or tank, but I have not been able to connect the phenomenon now described with anything of that sort. It generally lasts for several days, but may be confined to a small part of a tank without visible reason for the restriction.

The freshwaters of Kattywar are not materially different from those of Gujarat, except there are that no large rivers, few small ones, and by no means so many tanks as on the main land. The chain of lakes and marshes of which the Nal of Viramgaum is the

chief, lying on and often forming the boundary on the isthmus, belongs as much to the peninsula as to Gujarat proper; the chief difference between these provinces is geological, and outside of our present subject.

The next peninsula (one might almost say island), the principality of Cutch, belongs in most way to the region of the plain of the Indus; and must be considered with it. But its internal freshwaters are unimportant. The characteristic hydrographical feature of this part of the country is what we call the Ran, a great hollow separating Cutch from the main land, which becomes at times a shallow and brackish sea. Whether it has any peculiar fishes we do not know. It might fairly be expected to have some crustaceans of its own, but I have not heard of any, and have no personal acquaintance with that part of it lying north and east of Cutch. The branch called the little Ran, extending north of Kattywar to the British frontier at Patri and Kharaghora, does not appear to have any fishes, except such as come into it from the surrounding country in flood-time, all freshwater forms.

It may, however, fairly be hoped that the aquatic fauna of these interesting peninsulas will hereafter be fully described by some member better acquainted with them than I am.

MARATHI NAMES OF PLANTS.

WITH A GLOSSARY.

BY BRIGADE-SURGEON W. DYMCK.

(Continued from page 198.)

<i>Ficus retusa</i> , Linn.....	नंदूक Nandrák.
„ sp.	लुंगर Lúngar.
„ volubile, Dalz	दातीर Dátir.
<i>Flacourtia Cataphracta</i> , Roxb..	जंगम Jangam, तांबट Támbat.
„ inermis, Roxb.	तांबट Támbat.
„ montana, Grah ...	अटक Atak.
„ Ramontchi, L'Herit	काकई Káki, भेकल Bhékal.
„ sepiaria, Roxb	अत्रून Atrún.
<i>Flemingia Grahamiana</i> , W. & A.	दौदौला Daudaulá.
„ sp.	गरंगेरी Garangéri.

Flemingia strobilifera.....	बोंडर Bondar.
Fleurya interrupta	See Urtica interrupta.
Flueggea leucopyrus	See Securinega Leucopyrus.
„ virosa	See Securinega obovata.
Fœniculum vulgare, <i>Gärtn.</i> ...	बड़िशोप Barishoph, बरयाळी Varyáli.
Fraxinus Ornus, <i>Linn.</i> (Manna)	शीरखिस्त Shirkhist (<i>impd.</i>)
Fumaria officinalis, <i>Linn.</i>	शातरा Sháhterah (<i>impd.</i>)
„ parviflora, <i>Lam</i>	पित्तपापडा Pittapapara.
Garcinia indica, <i>Chois</i>	रतांबी or रतांबीर, Ratámbi or Ratámbir, भिरंड Bhirand.
„ „ (pickled fruit).	कोकम Kokam, अमसूल Amsal.
„ „ (raw fruit) ...	रतांबा Ratámba.
„ Morella, <i>Desrouss.</i> ...	मावरुख Mávarúkh.
„ „ (Gamboge) ...	रेवंचीनी शिरा Revanchini shirá (<i>impd.</i>)
„ ovalifolia, <i>Hook. f.</i> ...	तवीर Tavir, हळडी Haldi.
„ xanthochymus, <i>Hook. f.</i>	ऑंट or ओंछ, Aont or Aonsht.
Gardenia florida, <i>Roxb.</i>	अनंदराव Anandrao, अनंत Ananta.
„ gummifera, <i>Linn. f.</i>	डिकेमाली Dikémáli.
„ latifolia, <i>Ait.</i>	पांडू Pándurú, पापुर Pápúr, घोगरी Ghogari.
„ lucida, <i>Roxb.</i>	डिकेमाली Dikémáli.
„ turgida, <i>Roxb</i>	कुरफेंद्रा Kúrphendrá.
Garuga pinnata, <i>Roxb.</i>	कांकड Kankar, कुडक Kúdak.
Géissapsis cristata.....	बरकी Barki.
„ tenella.....	लहानबरकी Lahan barki.
Gelidium sp. var.	चिनई घास Chini ghás.
Gentiana lutea, <i>Linn.</i>	जिंतीआना Gintíaná.
„ sp.	गुलेघाफीस् Gulegháfis (<i>impd.</i>)
Gerardina heterophylla, <i>Dalz.</i> .	मोटी खाजोती Moti khájoti.
Cetonia floribunda	See Calycopteris floribunda.
Glinus lotoides.	See Mollugo hirta.
Glochidion lanceolarium.	See Phyllanthus lanceolarius,
Gloriosa superba, <i>Linn.</i>	कळलावी Kalalávi, खडयानाग Kharyánág, इंदय Indaye, वाघचबका Vághchabká.
Glossocardia Bosvallea.	फत्तरसूवा Phattarsúvá. G. linearifolia, <i>Cass.</i>
Glycosmis pentaphylla, <i>Corr.</i> ...	किरमिर Kirmir, रतकूर Ratkúr.
Glycyarpus racemosus.	See Nothopegia Colebrookiana.
Glycyrrhiza glabra, <i>Linn.</i>	जेष्टीमध Jeshtimadh.
Gmelina arborea, <i>Roxb.</i>	शिवण Shivan, गुमुड Gúmúd.
Gnetum scandens, <i>Roxb.</i>	कुंबळ Kúmbal, उंबळी Umbali.

<i>Gomphrena globosa</i> , <i>Roxb.</i>	जाफरी गुंदी Jáferi gúndi.
<i>Gossypium Stocksii</i> , <i>Mast</i> ..	रानकापूसी Rán-kápúsi (<i>Wild.</i>)
„ „ var. arboreum	हीरगुंदी कापूसी Hirgúndi kápúsi, पळहें or पलें Palhé or Palé.
„ „ var. herbaceum, <i>Linn.</i>	कापूसी Kápúsi.
„ „ var. religiosum.	देवकापूसी Dev kápusi, एकशेंग कापूसी Eksheng kápúsi. Yields Nankeen cotton.
<i>Grangea madraspatana</i> , <i>Poir.</i> ...	मशीपत्री Mashipatrī.
<i>Grewia asiatica</i> , <i>Linn.</i>	फळशी Phalshi.
„ <i>Microcos</i> , <i>Linn.</i>	शीरळ Shiral, हंसोळी Hansoli.
„ <i>pilosa</i> , <i>Lam.</i> ..	खटखटी Khat-khati.
„ <i>polygama</i> , <i>Roxb</i>	गौळी Gauli.
„ <i>populifolia</i> , <i>Vahl.</i>	गांगो Gángo.
„ <i>salvifolia</i> , <i>Heyne</i>	बिहल Bihal.
„ <i>tiliæfolia</i> , <i>Vahl.</i>	धामण Dháman, करकनी Karkani.
<i>Grislea tomentosa</i>	See <i>Woodfordia floribunda</i> .
<i>Guarea binectarifera</i>	See <i>Dysoxylum binectariferum</i> .
<i>Guatteria longifolia</i>	See <i>Polyalthia longifolia</i> .
„ <i>cerasoides</i>	See <i>Polyalthia cerasoides</i> .
<i>Guilandina Bonduc</i>	See <i>Cæsalpinia Bonduc</i> .
<i>Guizotia oleifera</i>	रामतीळ Rámtil, कारलीतीळ Kárlitil. <i>G. abyssinica</i> , <i>Cass.</i>
<i>Gymuema sylvestre</i> , <i>R. Br.</i>	कावळी Kávli, वाखंडी Vákhandi, काळी करदोडी Káli-kardori.
„ <i>nepaulensis</i>	See <i>Anodendron paniculatum</i> .
<i>Gymnosporia emarginata</i> , <i>Roth.</i>	इंगळी Ingli, इकरडी Ikarí, एंकोळ Enkol.
„ <i>montana</i>	मालकांगोणी Málkaugoni.
„ <i>Rothiana</i> , <i>W. & A.</i>	इंगळी Ingli, इकरडी Ikarí.
<i>Gynandropsis pentaphylla</i> , <i>DC.</i>	तिळवण Tilvan, तीलपर्णी Tilparni, माबली Mábli.
<i>Gynura nitida</i>	दाहन Dáhan.
<i>Gynocardia odorata</i> , <i>R. Br.</i> ...	चालमोग्रा Chálmográ, चावलमुंग्री Chávalmúngri.
<i>Habenaria</i> sp. var	ह्येनस Mhenas.
<i>Hagenia abyssinica</i> , <i>Willd.</i> ...	कुस्सो Kússó.
<i>Hamiltonia mysorensis</i>	गीदस Gidasa. <i>H. suaveolens</i> , <i>Roxb.</i>
<i>Haplanthus verticillaris</i> , <i>Nees.</i>	झांकरा Jhánkara, काळा आकडा Kálá-ákará, काळाकिराईत Kala Kirait.

Hardwickia binata, <i>Roxb.</i>	न्हइअंजन Nhaianjan, पारसीद् Pársid.
Hebradendron Gambogioides..	See Garcinia Morella.
Hedychium coronarium, <i>Linn.</i>	सोनटक्का Sontakká.
„ flavum, <i>Roxb.</i>	सोनटक्का Sontakká.
„ scaposum, <i>Nimmo.</i>	कोलार Kolár.
„ spicatum, <i>Ham</i> ..	कापूरकाचरी Kápúrkáchari (<i>sliced rhizome</i>) (<i>impd.</i>)
Hedyotis auricularia, <i>Linn.</i>	गैमरील Gaimaril.
„ dichotoma	See Oldenlandia dichotoma.
„ Heynii	See Oldenlandia Heynii.
Helianthus annuus, <i>Linn.</i>	सूर्याकान्त Súrýákánt, सूर्याकमल Súrýákamal.
Helicteres Isora, <i>Linn.</i>	केवन Kevan, वरकाटी Varkáti, धामणी Dhámani.
„ „ (fruit)	मुरुडशेंग Múrúsheng.
Heliotropium Eichwaldi, <i>Steud</i>	पोपट बूटी Popat-búti.
„ indicum, <i>Linn.</i>	सूर्याकमल Súrýákamal.
„ supinum	वडासूरी Varásúri.
Helmia bulbifera	See Dioscorea bulbifera.
Hemidesmus indicus, <i>R. Br.</i> ..	उपरसाळ or उपलसारी Uparsál or Upalsári, सारिवा Sáriva, अनंतमूळ, Anantamúl.
Hemigyrosa canescens, <i>Thwaites.</i>	कर्प Karpa.
Heracleum Pinda, <i>Dalz.</i>	पिंडा Pindá.
Heritiera littoralis, <i>Dryand</i> ...	सुंद्री Súndri.
Herpestis Monniera, <i>H. B. & Kth.</i>	बांब Bámb, नीरब्राह्मी Nirbrahmi.
Heterophragma chelonoides ...	See Stereospermum chelonoides.
„ Roxburghii, <i>D. C.</i>	वरस Varas, पांलग Pánlag.
„ suaveolens	See Stereospermum suaveolens.
Heynea trijuga, <i>Roxb.</i>	तीसूळ Tisúl, लिंबारा Limbára.
Hibiscus Abelmoschus, <i>Linn.</i> ..	कास्तुरी भेंडा Kastúri-bhendá.
„ cannabinus, <i>Linn.</i> ...	अंबाडा Ambára.
„ esculentus	भेंडा Bhendá. <i>H. cancellatus, Roxb., var. esculentus, Linn.</i>
„ rosa-sinensis.	जासवंद Jásavand. <i>H. floccosus, Mast., var. rosa-sinensis, Linn.</i>
„ Subdariffa, <i>Linn.</i> ...	लाल अंबाडा Lál ambára, पटवा Patvá.
„ tetraphyllus, <i>Roxb.</i> ...	रान भेंडा Rán-bhendá.
„ tiliaceus, <i>Linn.</i>	बेलपटा Belpatá.
Hippion orientale	See Enicostema littorale.
Hippocratea Grahmi, <i>Wight.</i>	येवती Yevati.

Hippocratea indica, Willd.....	कझूरती Kajhúratí, तरौली Taroli.
„ obtusifolia, Roxb..	डवशीर Daoshir.
Hiptage Madablota, Gärtn. ...	माधवेल Mádhvel, बोखारी Bokhári, हळदवेल Haladvel, अतिमुक्ता Atimúktá.
Holarrhena antidysenterica, Wall.	कुडा or पांढरा कुडा, Kurá or Pándhrá Kúrá.
„ „ (seeds).	कडू इन्द्रजव Karú indrajav.
Holcus cernuus	See Sorghum vulgare, var.
„ saccharatus	See Sorghum saccharatum.
„ Sorghum.....	See Sorghum vulgare.
„ spicatus	See Pennisetum typhoideum.
Holigarna longifolia	हुलगिरी Húlgiri. H. Arnotteana, H. f.
Holostemma Rheedii, Spr. ..	तुळतुळी Túltúli, दुदुरली Dúdúrli, शिंदोडी Shindori.
Hordeum vulgare, Linn.	जव Jav, यव Yava.
Hoya viridiflora	See Dregea volubilis.
„ Wightii, Hook. f.....	दुधवेल Dúdhvel, अंबरी Ambri.
Hydnocarpus inebrians	कडुकवठ Karúkavath. H. Wightiana, Bl.
Hydrocotyle asiatica, Linn. ...	ब्राह्मी Bráhmí, कारिंगा Káringá, कारिवणा or ना Kárivaná.
Hygrophylla spinosa, T. Anders.	कोराटा Koráta, कलसंदा Kalsanda, तालिमखाना Talimkhána, तालमखारा Talmakhára.
„ Serpyllum, T. Anders.	रानतेवान Rán-teván.
Hymenodictyon excelsum, Wall.	काळा कडवा Kálá-karvá. भोरसाल Bhorsál, दंडेल or दंडेली Dandél or Dandéli.
„ obovatum, Wall.	सीरीद Sirid.
Hyoscyamus seeds	खोरासानी अजवान Khorásáni ajván खोरासानी-ओंवा Khorásáni onvá (impd.)
Hypoxis brevifolia.....	{ मुसळी Múslí, काळी मुसळी Káli-múslí, कचुरी Kachúri.
„ malabarica	
„ orchiodes, Gärtn. ...	
Hyssopus sp.	झुफाई याबीस Zúfai-yábis, (impd.)
Ichnocarpus frutescens, Br....	कृष्णशरिवा Krishnásárivá, कांटेभौवरी Kánte-bhouri.
Ignatia amara.....	See Strychnos Ignatii.
Illicium anisatum (fruit)	बादिओनेखताई Bádiánékhatai (impd.)
Impatiens acaulis, Arn.....	लहानतेरडा Lahántéradá.
„ balsamina, Linn. ...	तेरडा Téradá.

<i>Impatiens oppositifolia</i> , <i>Linn.</i> ...	संमुखपत्री <i>Sanmúkh-patri.</i>
<i>Indigofera cordifolia</i> , <i>Heyne</i> ...	बेचका <i>Bechakà.</i>
„ <i>enneaphylla</i> , <i>Linn.</i> ...	भुईगुळी <i>Bhuigúli.</i>
„ <i>glandulosa</i> , <i>Willd.</i> ...	गवाचामलमंदी <i>Gaváchá'malmandi</i> , बरबेड <i>Baibed.</i>
„ <i>linifolia</i> , <i>Retz.</i>	जवारीचामलमंदी <i>Javárichámalmandi</i> , पांढराफळ <i>Pandharáphal.</i>
„ <i>pulchella</i> , <i>Roxb.</i> ...	चिमणडी <i>Chimnatti</i> , नेरडा <i>Nérdá.</i>
„ <i>tinctoria</i> , <i>Linn.</i>	भुई तरवड <i>Bhui tarvar.</i>
„ „ (indigo.)...	नीळ <i>Nil</i> , गुळी <i>Gúli.</i>
„ <i>trifoliata</i> , <i>Linn.</i>	वेकारिया <i>Vekáriya.</i>
<i>Inga dulcis</i>	<i>See Pithecolobium dulce.</i>
„ <i>xylocarpa</i>	<i>See Xylia dolabriformis.</i>
<i>Ionidium suffruticosum</i> , <i>Ging.</i> ...	रतनपरस <i>Ratanparas.</i>
<i>Ipomœa Batatas</i> , <i>Lam</i>	राताळू <i>Rátálú</i> , कांगी or कोंगी <i>Kángi or Kongi</i> , रतनवल <i>Ratanvel.</i>
„ <i>Bona-nox</i> , <i>Linn.</i>	चंद्रकांत <i>Chandrakant</i> , गुलचांदणी, <i>Gulchán-dani.</i>
„ <i>campanulata</i> , <i>Don.</i> ...	गवळी <i>Gavali.</i>
„ <i>coccinea</i> , <i>Linn.</i>	इष्कपेच <i>Ishkpecha.</i>
„ <i>cœrulea</i>	नीलपुष्पी <i>Nilapushi. I. hederacea, Jacq.</i>
„ „ (seeds.)	काळा दाणा <i>Kálá dáná.</i>
„ <i>digitata</i> , <i>Linn.</i>	भुईकोहोळा <i>Bhuikoholá</i> , विदारीकंद <i>Vidárikand.</i>
„ „ (young tubers).	असगंद <i>Asgand.</i>
„ <i>muricata</i> , <i>Jacq.</i>	भौरी <i>Bhauri.</i>
„ „ (seeds)	काळा दाणा <i>Kálá dáná.</i>
„ <i>pescaprae</i>	मर्याद्वेल <i>Maryádvél</i> , मर्जाद्वेल <i>Marjádvel. I biloba, Forsk.</i>
„ <i>Quamoclit</i> , <i>Linn</i>	गणेशवल <i>Ganeshvel</i> , सिताचे केस <i>Sita che kés.</i>
„ <i>reniformis</i> , <i>Chois</i>	उंदिरकानी <i>Undirkáni</i> , आखकर्णी <i>Ákhúkarni.</i>
„ <i>reptans</i>	नाळीची भाजी <i>Nalichi bhaji</i> , पानवेल <i>Pánvel, I. aquatica, Forsk.</i>
„ <i>sepiaria</i> , <i>Kæn.</i>	आमटी <i>Ámti.</i>
„ <i>turpethum</i> , <i>Br.</i>	निशोत्तर <i>Nishottar</i> , तेड <i>Ter</i> , शेतवड <i>Shetvar, शेताड Shetár, फूटकरी Phút-kari.</i>
„ <i>vitifolia</i> , <i>Sw.</i>	नावलीचावल or नाउळी <i>Návalichável or Naúli.</i>
<i>Iris germanica</i> , <i>Linn.</i> (root)...	बाखेबनफशा <i>Bikhébanafshá (impd.)</i>
„ <i>Pseudacorus</i> , <i>Linn.</i> (rhizome).	पाषाणभेद <i>Páshánbhéd (impd.)</i>
<i>Isachne elegans</i> , <i>Dalz.</i>	दुंड <i>Dúnd.</i>
<i>Ischæmum pilosum</i> , <i>Wight</i> ...	नथ <i>Nath</i> , कुंड <i>Kúnd.</i>

<i>Ixora coccinea</i> , <i>Linn</i>	बकोरा Bakorá, पेडगूळ or पेडगुळ Pentgúl or Pendgúl.
„ <i>nigricans</i> , <i>Br.</i>	कटकूरा Katkúrá.
„ <i>parviflora</i> , <i>Vahl.</i>	कूरत Kúrat, राईकूरा Raikúrá, माकडीचेंझाड Mákríchejhar.
<i>Jambosa vulgaris</i>	See <i>Eugenia Jambos</i> .
<i>Jasminum angustifolium</i> , <i>Roxb</i>	रेवती Revati, रानमोगरा Ránmográ,
„ <i>arborescens</i> , <i>Roxb.</i>	कुंद or कुंदी Kúnd or Kúndi.
„ <i>aureum</i> , <i>Don.</i>	पिवळी जुई Pivalijui, सोनजुई Sonjúi.
„ <i>auriculatum</i> , <i>Roxb.</i>	जाई Jai, जुई Jui.
„ <i>elongatum</i>	नेवाळी Nevali, <i>J. Roxburghianum</i> , <i>Wall.</i>
„ <i>grandiflorum</i> , <i>Linn.</i>	चमेली Chameli.
„ <i>latifolium</i>	कूसर Kúsar. <i>J. arborescens</i> , <i>Roxb.</i> var. <i>latifolia</i> .
„ <i>officinale</i> , <i>Linn</i> ..	सायली Sáyli.
„ <i>pubescens</i> , <i>Willd.</i>	विखमोगरा Vikmogra.
„ <i>Sambac</i> , <i>Aiton.</i>	मोगरा Mográ.
„ „ (double var)	बटमोगरा Batmográ.
<i>Jateorrhiza palmata</i> , <i>Miers.</i> (root).	कलुमकाचरी Kalámkáchari (<i>impd.</i>)
<i>Jatropha Curcas</i> , <i>Linn.</i>	मोघलीएरंडी Moghli erandi, जईपाल Jaipál.
„ <i>glandulifera</i> , <i>Roxb.</i>	जंगलीएरंडी Jangli erandi, अंदरबीबी Under bibi.
„ <i>Manibot</i> , <i>Willd.</i>	सांवरचायनें Savarcháyén.
„ <i>multifida</i> , <i>Linn</i>	चिनई एरंडी Chini-erandi.
„ <i>nana</i> , <i>Dalz</i>	कीकुंडी Kírkúndi.
<i>Johnia congesta</i>	See <i>Dolichos biflorus</i> .
<i>Jonesia Asoka</i>	See <i>Saraca indica</i> .
<i>Juglans regia</i> , <i>Linn.</i> (fruit) ...	अक्रोट Akrot (<i>impd.</i>)
<i>Juniperus communis</i> , <i>Linn.</i> (fruit).	अबहल Abhal, हबेलअरहर Habelarhar (<i>impd.</i>)
<i>Jussiaea villosa</i>	पानलवंग Panalavenga. <i>J. suffruticosa</i> , <i>Linn.</i>
<i>Justicia Adhatoda</i>	See <i>Adhatoda vasica</i> .
„ <i>Ecbolium</i>	See <i>Ecbolium Linneanum</i> .
„ <i>echioides</i>	See <i>Andrographis echiodes</i> .
„ <i>Gendarussa</i> , <i>Linn. f.</i>	तिव Teo, बाकस Bákas.
„ <i>infundibuliformis</i> , <i>Willd.</i>	आबोली Áboli, vulg. अबोली Aboli
„ <i>paniculata</i>	See <i>Andrographis paniculata</i> .
„ <i>picta</i> , <i>Roxb.</i>	करड अडुळसा Karad-adúlsá.

<i>Justicia picta</i> var., <i>nigricans</i> ..	काळा अडुळसा Kálá-adúlsá.
„ <i>procumbens</i> , <i>Nees</i>	घाटीपित्तपापडा Gháti pitpápara.
„ <i>trinervia</i>	मूत Sút
„ <i>verticillata</i>	See <i>Haplanthus verticillaris</i> .
<i>Kalanchoe laciniata</i> , <i>D. C.</i> ...	पर्णबीज Parnabij.
„ <i>pinnata</i>	See <i>Bryophyllum calycinum</i> .
<i>Kæmpferia galanga</i> , <i>Linn.</i> ...	चंडमूला Chandamúlá, चंडहासा Chandhása.
„ <i>rotunda</i> , <i>Linn.</i>	भुईचाफा Bhui cháphá, भुईचांपा Bhui-champá.
<i>Kydia calycina</i> , <i>Roxb.</i>	वारंग Varang, वारंगड Varangar, भोटी Bhoti, पोदारी Potári.
<i>Kyllingia monocephala</i> , <i>Linn.</i> ...	निर्विषी Nirvishi.
<i>Lablab vulgaris</i>	See <i>Dolichos Lablab</i> .
<i>Lactuca Heyneana</i>	सादीमांदी Sadimándi.
„ <i>remotiflora</i> , <i>D. C.</i>	उंदीरकानी Undirkáni.
„ <i>scariola</i> , <i>Linn.</i> var. <i>sativa</i> .	काहू Kahú.
<i>Lagenandra toxicaria</i> , <i>Dalz.</i>	वत्सनाभ Vatsanabha.
<i>Lagenaria vulgaris</i> , <i>Seringe.</i> ...	कडुभोपळा Karúbhopla, कटूतुंबी Katútúmbi, अलाबू Alábú.
<i>Lagerstræmia indica</i> , <i>W. & A.</i>	चिनिई मेंदी Chini-mendi.
„ <i>lanceolata</i> , <i>Bedd.</i>	बोंडर Bondar, कुंबिया Kumbiyá, बोंडगी Bondagi, सुकुत्या Súkútyá.
„ <i>parviflora</i> , <i>Hook.</i> ..	लहानबोंडर Lahán bondar, &c., &c.
„ <i>reginæ</i> <i>Retz.</i>	तमण Taman.
<i>Lagera aurita</i> , <i>Schultz-Bip.</i>	जंगली मुळी Jangli-múli.
<i>Lallemantia Royleana</i> , <i>Bth.</i> (seed.)	तुकमेबालंग Túkmebálang (<i>impd.</i>).
<i>Lamprachænium microcephalum</i>	ब्रह्मदंडी Brahmadandi.
<i>Lantana indica</i> , <i>Roxb.</i>	घाणेरी Gháneri.. The foreign species bear the same name.
<i>Lasiosiphon speciosus</i> , <i>Dene.</i> ...	रामेठा Rámethá.
<i>Lathyrus sativus</i> , <i>Linn.</i>	लांग Láng.
<i>Laurus glaucescens</i>	See <i>Machilus glaucescens</i> .
<i>Launæa pinnatifida</i> , <i>Cass.</i>	अलमिरो Almiro, पाथ्री Páthri.
<i>Lavandula Burmanni</i> , <i>Benth.</i> ...	दोरेआ Gorea, आस्मान्नी Asmání.
„ <i>Stoechas</i> , <i>Linn.</i>	ऊस्तखुदूस Ustakhúdús (<i>impd.</i>).
<i>Lawsonia alba</i> , <i>Lam.</i>	मेंदी Mendi.

<i>Lebedieropsis orbicularis</i> , Müll-Arg.	गरारी Garári.
<i>Ledebouria hyacinthoides</i>	See <i>Scilla hyacinthoides</i> .
<i>Leea crispa</i> , Willd.	रायडिंडा Raidindá.
„ <i>hirta</i> , Roxb.	काकजंघा Kákjanghá.
„ <i>macrophylla</i> , Roxb.	डिंडा Dindá.
„ <i>staphylea</i>	अलथे Althé, करकनी Karkani. <i>Leea sambuciná</i> , Willd.
<i>Leersia aristata</i> , Roxb.	चौरन Chauran.
<i>Leonotis nepetæfolia</i> , Br.	मातीसूल Mátisúl, दिपमाळ Dipmál.
<i>Lepidigathis cristata</i> , Willd....	भुईतेरडा Bhuiterađa, कोल्हेचे चुतड Kolheché-chútar.
„ <i>grandiflora</i>	See <i>Calacanthus Dalzelliana</i> .
„ <i>prostrata</i> , Dalz....	बकरा Bakrá.
<i>Lepidium Iberis</i> , Linn. (seeds),	तोद्री Todri (<i>impd.</i>).
„ <i>sativum</i> , Linn.	असालिया Asáliyá, अहळीव Ahaliv.
<i>Leptadenia Jacquemontiana</i> ...	किप Kip. <i>L. Spartium</i> , Wight.
„ <i>reticulata</i> , W. & A	रायडोडी Raidori, शिंगूटी Shingúti, खारखोडी Kháikhori.
<i>Lettsonia elliptica</i> , Wight....	बोंडवेल Bondvel, केदारी Kedári.
<i>Leucas aspera</i> , Spr.	थरडूरीभाजी Thurdúribháji.
„ <i>cephalotes</i> , Spr.	तुंबा Tumbá.
„ <i>longifolia</i> , Benth.	गोमा Gomá.
„ <i>stelligera</i> , Wall.	बूहंदी Búrímbi, गोमा Gomá.
<i>Limnanthemum cristatum</i> , Griseb.	खतारा Khatára, कुमुद Kúmúd.
<i>Lindenbergia urticæfolia</i> , Lehm	ढोल Dhol, गझदर Gazdar.
<i>Linum mysorens</i> , Heyne	उंद्री Undri, बांबुर्ती Bámbúrti.
„ <i>trigynum</i>	See <i>Reinwardtia trigyna</i> .
„ <i>usitatissimum</i> , Linn. ...	अळशी Alashi, जवस Javas.
<i>Lippia nodiflora</i> , Rich.	रतोलिया Ratoliyá, वक्कन Vakkan.
<i>Liquidambar orientalis</i> , Miller. (Storax)	शिलारस Siláras (<i>impd.</i>)
<i>Litsæa lancifolia</i> , Roxb.	गुलचाई Gúlchai.
„ <i>polyantha</i> , Juss.	कालेंझाड Káléjhar, पिसा or पिशाल Pisá or Pishál.
„ <i>sebifera</i> , Pers.	मैदालकडी Maidálakrí.
„ <i>tomentosa</i> , Herb.	चिकणा Chikná.
„ <i>zeylanica</i> , C. & Fr. Nees.	कानवेल Kánvel चिर्चिरा Chirchirá.
<i>Lobelia nicotianæfolia</i> , Heyne.	ढवल Dhaval, देवनळ Deonal.

<i>Lodoicea seychellarum</i> , <i>Labill.</i>	दर्यायनारळ Daryai náral, जहरीनारळ Jahari-náral.
<i>Lonicera Leschenaultii</i> , <i>Wall.</i>	हडी Hadí.
<i>Lophopetalum Wightianum</i> , <i>Arn</i>	बोलपालें Bolpálé.
<i>Loranthus amplexifolius</i> <i>W. & A.</i>	बैनगूळी Baingúli (Grah 671).
„ <i>longiflorus</i> , <i>Desv.</i> ...	बंदाकपुष्प Bandákpúshp.
„ sp. var., a general name for parasites..	वंदा Vándá.
<i>Luffa acutangula</i> , <i>Roxb.</i>	घोसाळी Ghosáli, तुराई Túrai, शिरोळा Shirolá, गिलचीदोडकी Gilchidorki.
„ „ var. <i>amara</i> .	कडूदोडकी Karú dorki, कडूघोसाळी Karú ghosáli.
„ <i>echinata</i> , <i>Roxb.</i>	देवडांगरी Deodángri, कुकुडवेल Kúkúrvél.
„ <i>pentandra</i>	घोसाळी Ghosáli, पारोसी Párosi. <i>L. ægyptiaca</i> , <i>Mill</i>
<i>Lupinus albus</i> , <i>Linn.</i> (seeds).	तिरमिसू Tirmis (<i>impd.</i>)
<i>Lycium europæum</i> , <i>Linn.</i>	गांग्रा Gángro, चिरचिहा Chirchitta.
<i>Lycoperdon pratense</i> , <i>Linn.</i> ..	भुईफोड Bhuiphor.
<i>Lygodium pinnatifidum</i> , <i>Spr.</i> ..	जानवेली Jánveli, हसराजवेल Hansrájvel.
<i>Maba nigrescens</i> , <i>Dalz.</i>	रक्तरोहिडा or रोडा Raktarohidá or Raktarorá.
<i>Macaranga Roxburghii</i>	चांदवड Chándvar, चंदर Chandar, चांदाड Chándár. <i>M. tomentosa</i> , <i>Wight.</i>
<i>Machilus glaucescens</i>	गुलंब Gúlamb, कुरमा Kúrmá. <i>M. micrantha</i> , <i>Nees.</i>
<i>Mæsa indica</i> , <i>Wall.</i>	अटकी or आटकी Atki or Átki.
<i>Mallotus philippinensis</i> , <i>Müll.</i>	कपिला Kapitá, कपिता Kapitá, कमिला Kamilá, रोहिण Rohin.
<i>Malva sylvestris</i> , <i>Linn.</i>	त्रिकाळी Trikáli.
„ „ (fruit.)	खुबाझी Khúbázi (<i>impd.</i>)
<i>Mangifera indica</i> , <i>Linn.</i>	आंबा Ambá, आम Ám.
„ „ (dried unripe fruit.)	अंबोझी Ambosi.
„ „ (dried juice of ripe fruit)	अंबपुरी Ambapúri, आंब्याचेंसाठ Ambiyá- chesáth.
„ „ (seed)	आंबाबाठ Ámbabátha.
<i>Mappia oblonga</i> , <i>Miers</i>	गूर Gúr, कलगूर Kalgúr.
<i>Marsdenia tenacissima</i> , <i>W & A.</i>	हब् Hab.
<i>Martynia diandra</i> , <i>Gloxin.</i>	विंचू Vinchú.

Mathiola incana, <i>R. Br.</i> (seed.)	तोद्री Todri (<i>impd.</i>)
Matricaria Chamomilla, <i>Linn.</i> ...	बाबूना Bábúná.
Malaleuca leucadendron, <i>Linn</i> (oil.)	कायापुटी Kayapúti (<i>impd.</i>)
Malastoma malabathricum, <i>Linn.</i>	पालेरें Páloré.
Melhania abyssinica, <i>A. Rich</i> ...	ब्राही Bráhri.
Melia Azadirachta, <i>Linn.</i>	निंब or लिंब Nimb or Limb, कडूनिंब Karú nimb, बाळलिंब Bállimb.
„ Azedarach, <i>Linn.</i>	बकायण Bakáyan, द्रेक Drek.
„ dubia, <i>Cav.</i>	लिंबारा or निंबारा Limbárá or Nimbara.
„ „ (fruit).	काळाखजूर Kala khajúr, कडवाखजूर Karva khajúr.
Melilotus hamosa, <i>Link.</i> (pods)	अक्लिउल्मलिक Aklilulmalik (<i>impd.</i>)
„ parviflora, <i>Desf.</i>	वनमेथिका Vanmethiká, झीर Zir.
Melochia velutina, <i>Bedd.</i>	मैथोरी Maithori.
Memecylon edule, <i>Roeb.</i>	अंजन Anjan, याल्की Yálki, कूर्प Kúrpa, लोखंडी Lokhandi.
Mengia tenuifolia	See <i>Amarantus tenuifolius</i> .
Mentha arvensis, <i>Linn.</i> (sweet mint).	पुदीना Púdiná, वतलाव Vatalav.
„ incana, <i>Willd.</i> (Bombay Peppermint).	
Meriandra bengalensis, <i>Benth.</i>	शेस्ती Shesti.
Mesua ferrea, <i>Linn.</i>	नागचंपा Nágchampá.
Michelia Champaca, <i>Linn.</i>	पिवळा चाफा Pivalá chaphá.
Micromeria stellata.	कडवट Karvat.
Microrhynchus sarmentosus...	See <i>Lamæa pinnatifida</i> .
Milletia auriculata, <i>Baker.</i>	जिऱ्हुळ Jithúl.
Millingtonia hortensis, <i>Linn. f.</i>	नीमीचंबेली Nimi chambeli, आकाशनिंब Ákás nimb.
Mimosa hamata, <i>Willd.</i>	अरकर Arkar.
„ pudica, <i>Linn.</i>	लाजाळू Lájálú, लाजरी Lájri.
„ rubricaulis, <i>Linn.</i>	अराई Arai.
Mimusopis Elengi, <i>Linn.</i>	बकुळी Bakúli, आंवळी Ovali.
„ hexandra, <i>Roeb.</i>	केर्णी Kerni, रांजण Ránjana रायणी Raini.
„ Kanki, <i>Linn.</i>	अडोम Adom (of Goa).
Mirabilis Jalapa, <i>Linn.</i>	गुल अब्बास् Gúl Abbás, संध्याकाळी Sandhyá káli. (<i>Evening flower</i>).
Modecca palmata, <i>Lam.</i>	उंडळ Úndal.
Molluga hirta, <i>Thunb.</i>	कोथक Kothak.

Molluga pentaphylla.	झरस Jharas. <i>M. stricta</i> , <i>Linn.</i>
Momordica Balsamina, <i>Linn.</i> ...	करेलो जंग्रो Karélo-jangro.
„ Charantia, <i>Linn.</i> ...	कारली, कारवेल, कारती, कारलें, करेलो, औबलें, Kàrli, Kàrvel, Kárti, Karlé, Karélo, Omblé.
„ Cymbalaria, <i>Fenz.</i> ...	कडवंची Kadavanchi.
„ dioica, <i>Roxb.</i>	करंटोली Karantoli, करंटोली Kartoli.
Morinda bracteata.....	नागकूडा Nágkúrá. <i>M. citrifolia</i> , var., <i>Linn.</i>
„ citrifolia, <i>Linn.</i>	आल Ála, आलें or आऊल Álé or Áúla, बारतोंडी Bártondi.
„ tomentosa	असेती Aséti. <i>M. tinctoria</i> , <i>Roxb.</i> var.
Moringa concanensis, <i>Nimmo.</i> ...	रानशेवगा or शेगट Rán-shegva or Shégat.
„ pterygosperma, <i>Gärtn.</i>	शेगट or शेगवा Shégat or Shégvá.
Morus indica, <i>Linn.</i>	तूट Tút, अंबट Ambat.
Mucuna monosperma, <i>D. C.</i> ...	मोठी कुहिली Mothi-kúhili.
„ pruriens, <i>D. C.</i>	कुहिली Kúhili, कांटिकुयरी Kánté-kúyeri.
„ „ (cultivated.)	गोडी कुयली Gorí-kúyeli.
Mukia scabrella, <i>Arn.</i>	चिराटी Chiráti.
Mundulea suberosa, <i>Benth.</i> ...	सूपी or सूसी Supi or Súpti.
Murraya exotica, <i>W. & A.</i>	कूंडी Kúnti.
„ Koenigii, <i>Spreng.</i>	झिरंग Jhirang, कडीनिंब Kadhi nimb, गोडीनिंब Gorinimb.
Mnsa ornata, <i>Roxb.</i>	कौदीर Kaudir, रानकेळ Ránkel, कवदर Kavdar
„ sapientum, <i>Linn.</i>	केळ Kél.
„ superba, <i>Roxb.</i>	चवई or चवईण Chavi or Chavin.
Mussaenda frondosa, <i>Linn.</i>	भूटकेस Bhútkés, लावसट Lavasat, शिवरडोळी Shivardoli.
Myrica sapida, <i>Wall.</i>	कायफळ Kayphal.
Myristica malabarica, <i>Lam.</i> ...	रानजायफळ Rán jayphal, रामफळ Rám- phal.
„ „ (seed) ...	कायफळ Kayphal.
„ „ (mace) ...	रामपत्री Rámpatri.
„ moschata, <i>Willd.</i> ...	जायफळ Jayphal.
„ „ (mace) ...	जायपत्री Jaypatri (<i>impd.</i>)
„ „ (seed) ...	जायफळ Jayphal (<i>impd.</i>)
Myrtus communis, <i>Linn.</i>	विलायती-मेंदी Viláyati-mendi.
„ „ (berries).....	हबडलआस् Habul-Aas (<i>impd.</i>)
Nannorrops Ritchieana, <i>Wendl.</i>	फीस् Fis.
Nardostachys Jatamansi, <i>D. C.</i> (rhizome.)	जटामांसी Jatámansi, बालचर Bálchar, सुंबूल Súmbúl (<i>impd.</i>)

Naregamia alata, <i>W. & A.</i>	कापूरभेंडी Kápúrbhendi, पिच्चेल Pittvel तीनपानी Tinpáni, Trifolio (Port.)
Narthex assafœtida	See Ferula Narthex.
Nauclea Cadamba.....	See Anthocephalus Cadamba.
„ cordifolia	See Adina cordifolia.
„ elliptica	पूग or फूज Púg or Phúj. N. missionis, Wall.
„ parviflora	See Stephegyne parviflora.
„ purpurea, <i>Roxb</i>	देवफणस Deophanas.
Nelumbium speciosum, <i>Willd.</i>	कमळ Kamal, पोंशेर कमळ Poshér-kamal, पंद- कांदा Pandkándá, पोंशेरें Posheré, निलोफर Nilophar, पब्बन Pabban.
„ „ (seeds)...	कमळकाकडी Kamalkákari, पबोरा Paborá.
„ „ (scapes)...	भिशी Bhishi.
Nemeda Nimmonii	See Amoorá Lawii.
Nepeta ciliaris, <i>Benth.</i>	झूफा Zúfá.
Nephelium Litchi, <i>Camb.</i>	लीची Lichi.
„ Longana, <i>Camb.</i>	उंब or ओंब, Umb or Aomb, आषफळ Ashphal.
Nerium odorum, <i>Solan.</i>	कण्हेर Kanhér, कणेर or कणेरी, Kanér or Kanérí.
Nicandra physaloides, <i>Gartn.</i> ...	रानपोपटी Ránpopti.
Nicotiana Tabacum, <i>Linn</i>	तंबाखू Tambákhú.
Nigella indica.....	कालेंजिरें Kaléjiré, कलोजी Kalonji. N. sativa, <i>Sibthorp.</i>
Nothopegia Colebrookiana, <i>Blume</i>	अंबेरी Ambéri.
Notonia balsamica, <i>Dalz.</i>	पिरंग Pirang.
„ corymbosa	वांदररोटी Vándar roti. N. grandiflora, <i>D. C.</i>
Nyctanthes arbor-tristis, <i>Linn.</i> ...	पारिजातक Párijátak, हरशिंगर Harsingar.
Nymphæa Lotus, <i>Linn.</i>	उपळी-कमळ Upli-kamal, कूनी Kúni.
Ochrocarpus longifolius, <i>Benth.</i>	गोडी-उंडी Gori úndi, पन्नाग Punnág, सुरंगी Súrangí, हरक्या Harakia.
„ „ (buds).	तांबडे-नागकेशर Támbaré-nágkesar.
Ocimum basilicum, <i>Linn.</i>	सब्जी Subji, अजवला Ajvalá.
„ „ var	अजगंद Ajganda.
„ canum, <i>Sims.</i>	रानतुळस Rántúlas. .
„ gratissimum, <i>Linn.</i>	रामतुळस Rámtúlas, मालीतुळस Málitúlas, रामदु- ती Rámdúti.
„ pilosum	तुखमेरीहान Túkmerihán. O. basilicum, <i>Linn</i> var. (<i>impd.</i>)

<i>Ocimum sanctum</i> , <i>Linn.</i>	तुळस Tulas.
<i>Odina Wodier</i> , <i>Roxb.</i>	शिंटी Shimti, मोय Moy.
<i>Olex scandens</i> , <i>Roxb.</i>	हरदुली Hardúli, अरचिरी Archiri.
„ <i>Wightiana</i> , <i>Wall.</i>	काळा गोंडा Kálágondá.
<i>Oldenlandia corymbosa</i> , <i>Linn.</i> ..) फापटी Phápati. काझरी Kázúri, क्षेत्रपर्वटी Kshetraparpati, परिपाट Paripát.
„ <i>dichotoma</i> , <i>Kæn.</i> ..	
„ <i>Heynii</i> , <i>Br.</i>	
<i>Olea dioica</i> , <i>Roxb.</i>	करंबू Karambú, पारजांब Parjámb.
„ <i>ferruginea</i>	खाव Khav. <i>O. cuspidata</i> , <i>Wall.</i>
<i>Ophelia chirata</i>	See <i>Swertia chirata</i> .
„ <i>elegans</i>	See <i>Swertia affinis</i> .
„ <i>multiflora</i>	See <i>Swertia decussata</i> .
„ <i>pauciflora</i>	See <i>Swertia corymbosa</i> , var. <i>Lawii</i> .
<i>Ophioxylon serpentinum</i>	See <i>Rawolfia serpentina</i> .
<i>Oplismenus colonus</i>	See <i>Panicum colonum</i> .
<i>Orchis</i> , sp. var. (tubers).....	सालबमिसरी Sálabmisri (<i>impd.</i>)
<i>Origanum marjorana</i> , <i>Linn.</i> ...	मरवा Marvá.
<i>Oroxylum indicum</i> , <i>Vent</i>	टेदू Tetú, टायिटू Tayitú, फलफरा Phalphára, जगदळा Jagdalá.
<i>Oryza sativa</i> , <i>Linn.</i>	भात Bhát, डांगर Dáugar, सारी Sári.
„ „ var	अंबेमोहर Ambemohar.
„ „ wild.....	देवभात Deobhát.
„ „ (cleaned grain.)	तांदूळ Tándúl.
<i>Osmunda regalis</i>	नदीचा मुरुड Nadicha múrúr.
<i>Ougenia dalbergioides</i> , <i>Benth.</i> ..	तनज Tanaj.
<i>Oxalis corniculata</i> , <i>Linn</i>	अंबुटी Ambúti, भुईसर्पटी Bhui-sarpati, नालकर- डा Nálkarda, अंबोशी Ámboshi, लांडगा Lándagá.
„ <i>sensitiva</i>	See <i>Biophytum sensitivum</i> .
<i>Oxystelma esculentum</i> , <i>Br.</i>	दूधिका Dúdhiká, दुधानी Dúdháni.
<i>Pæderia foetida</i> , <i>Linn.</i>	हरणवेल Hiranvel.
<i>Pæonia officinalis</i>	उदेसालब Udesálab, मामेख Mámekh. P. Emodi, <i>Wall.</i>
<i>Panax Ginseng</i> , <i>C. A. Myer</i> ..	जिनसिंग Jinsing (<i>impd.</i>)
<i>Pancratium parvum</i> , <i>Dalz.</i> ...	खिदाळू Khindálú, भूकमळ Bhukmal, महादकांदा Mahádkánda.
<i>Pandanus odoratissimus</i> , <i>Linn.</i> ..	केवडा Kevará, केतक Kétak.
<i>Panicum colonum</i> , <i>Linn.</i>	रानसवा Rán savá, सावक Sávak, कुरुंद Kúrúnd
„ <i>coloratum</i>	धांड Dhánd. <i>P. crus-galli</i> , <i>Linn.</i>

<i>Panicum flavidum</i>	बुडी Búrti, <i>P. brizoides</i> , <i>Linn.</i>
„ <i>frumentaceum</i> , <i>Roxb.</i>	कथली Kathli, शमूला Shamúlá.
„ <i>italicum</i>	<i>See Setaria italica.</i>
„ <i>miliaceum</i> , <i>Linn.</i>	वरिसावा Varísává.
„ <i>miliare</i> , <i>Lamb.</i>	नेलाशमालू Nelashamálú, नैनिया Nainiyá.
„ <i>pilosum</i>	<i>See Setaria glauca.</i>
„ <i>sp.</i> (Dangali)	<i>See Pennisetum typhoidenm, var.</i>
<i>Papaver Rheas</i> , <i>Linn.</i>	लाला Lálá, जंगली मुद्रिका Jangli Múdríka.
„ <i>somniferum</i> , <i>Linn.</i> ...	खसखसीचें झाड Khaskhassi che jhár.
„ „ (capsules) ...	पोस्त Post.
„ „ (opium)	अफू Aphú, अफीम Aphim.
<i>Paracaryum caelestinum</i> , <i>Benth</i>	निसूरडी Nisúrdi.
<i>Paramigyna monophylla</i> , <i>Wight.</i>	खारावागेटी or वाघंटी, Khárávágeti or vághanti, कडवी-वागेटी or वाघंटी, Karvi vágeti or vághanti.
<i>Parinarium excelsum</i>	मातुंबा Mátumbá (of Goa).
<i>Parkia biglandulosa</i> , <i>W. & A.</i> ...	चेंडूफळ Chendúphal, गेंदू Gendú, हेंदू Jhendú.
<i>Parkinsonia aculeata</i> , <i>Linn.</i> ...	विलायती बाभूळ Viláyeti-bábhúl, केशरी-बाभूळ Kesri-bábhúl.
<i>Parmelia caperata</i> , <i>Ach.</i>	बारिक दगड फूल Barik dagar phúl.
„ <i>kamtschadalis</i> , <i>Esch.</i>	उस्ना Úsná.
„ <i>perlata</i> , <i>Ach.</i>	मोठें दगडफूल Mothe dagar phúl.

(To be continued.)

FURTHER NOTE ON *HESTIA MALABARICA*.

BY LIONEL DE NICÉVILLE, F.E.S.

On page 164 of Vol. II. of the Journal of the *Bombay Natural History Society*, Captain T. Macpherson has given a very full account of the transformations of *Hestia malabarica*, Moore. This species should, in my opinion, be sunk as a synonym of *Hestia lynceus*, Drury, the latter proving to be, the more we know of it, an eminently variable species. Mr. F. Moore has lately (*Proc. Zool. Soc., Lond.* 1883, p. 218), described and named three of these variable forms from the Malay Peninsula, which Mr. Distant (*Rhop. Malay.*, p. 405), has very properly sunk as synonyms. To have been consistent, Mr. Moore should also have described the numerous varietal forms of *Hestia jasonia*, Westwood, which occur in

Ceylon, as distinct species, but as that island represents but a very small geographical area, he very wisely refrained from doing so. But the object of this Note is not so much to correct the name by which this species should be known, but to point out that Captain Macpherson is not quite correct in stating that "nothing is known regarding its early history." As far back as 1857, Mr. Moore published figures of the larva and pupa of this species (Cat. Lep. Mus. E. I. C., p. 134, n. 267, pl. IV., Figs. 11, 11a) under the name of *Ideopsis daos*, Boisduval. From these figures a brief description was drawn up by Major Marshall and myself in "The Butterflies of India, Burmah and Ceylon," Vol. I., p. 30. The original discoverer was a Captain Hamilton, who is said to have found them on the Tenasserim coast. This identification, however, was an error, as the following extract from Mr. Moore's paper in Proc. Zool. Soc., Lond., 1883, p. 220, n. 12, under *Hestia malabarica*, shows:—"The larva and pupa of *H. malabarica* were figured in the Catal. Lep. Mus. E. I. Co., pl. IV., fig. 11, 11a, in error for those of *G.* [= *Ideopsis*] *daos*. The figures there engraved were stated by Prof. Westwood to represent the transformation of *G. daos*; the drawings (now in the Library of the Entomological Society of London) were received by him from Capt. Hamilton; and the species in question was stated to be from the Tenasserim coast."

"In a letter which I subsequently received from Mrs. Hamilton, this lady informed me that the drawings of the above-mentioned larva and pupa were made from specimens taken on the Cotiaddy Pass, in the Western Ghats of Southern India, not in Tenasserim as stated by Prof. Westwood [Proc. Ent. Soc., Lond., new series, Vol. I., p. 35, 1850]. This identity is also confirmed by other drawings of the metamorphoses of the same insects, now in my possession."

In the last para. but four of Captain Macpherson's description there is a stupid misprint. For "suspended from its *oval* segment," read "*anal*."

I hope, in conclusion, that the Botanical Section of the Society has ere this been able to identify the food-plant of *Hestia lynceus*; specimens of it, Captain Macpherson informs me, having been forwarded to it for that purpose. Should this be so, a note might be added to this paper giving its name, and the Natural Order to which it belongs.

LIST OF BIRDS COLLECTED BY CAPTAIN F. BABINGTON PEILE,
IN CASHMERE DURING THE SUMMER OF 1887, AND PRESENTED BY HIM
TO THE
BOMBAY NATURAL HISTORY SOCIETY.

Jerdon's No.	Scientific Name.	English Name.	No. of Specimens.
121	<i>Merops apiaster, Lin.</i>	The European Bee-eater ...	3
125	<i>Coracias garrula, Lin.</i>	The European Roller	2
134 bis.	<i>Alcedo ispida, Lin.</i>	The European King-Fisher. .	3
150	<i>Palæornis schisticeps, Hodgs</i>	The Slaty-headed Paroquet.	1
154	<i>Picus himalayanus, Jard</i>	The Himalayan Pied Woodpecker.	1
199	<i>Cuculus canorus, Lin</i>	The Cuckoo	1
254	<i>Upupa epops, Lin</i>	The European Hoopoe	1
273	<i>Pericrocotus brevirostris, Vig.</i>	The Short-billed Minivet ...	1
280	<i>Buchanga longicaudatus, Hay.</i>	The Long-tailed King-Crow.	2
288	<i>Muscipeta paradisi, Lin.</i>	The Paradise Flycatcher ...	9
353	<i>Petrophila cinclorhynchus, Vig.</i> ...	The Blue-headed Chat Thrush.	2
444	<i>Hypsipetes psaroides, Vig.</i>	The Himalayan Black Bulbul.	1
470	<i>Oriolus kundoo, Sykes</i>	The Indian Oriole	4
483	<i>Pratincola indicus, Bly.</i>	The Indian Stonechat.....	2
505	<i>Rhyacornis fuliginosus, Vig.</i>	The Plumbeous Water-Robin.	1
665	<i>Corvus monedula, Lin.</i>	The Jackdaw	1
667	<i>Nucifraga multipunctata, Gould</i> ...	The Many-spotted Nutcracker.	1
672	<i>Urocissa flavirostris, Bly.</i>	The Yellow-billed Blue Magpie.	2
718	<i>Calacanthus burtoni, Gould.</i>	The Crimson-browed Finch.	2
792	<i>Turtur pulchratus, Hodgs.</i>	The Turtle Dove	1
804	<i>Lophophorus impeyanus, Lath</i>	The Monaul	3
808	<i>Pucrasia macrolopha, Less.</i> ...	The Puckrass	1
901	<i>Hydrophasianus chirurgus, Scop</i> ...	The Pheasant-tailed Jacana.	1
911	<i>Porzana fusca, Lin.</i>	The Ruddy Rail	1
937	<i>Nycticorax griseus, Lin.</i>	The Night Heron.....	1
984	<i>Hydrochelidon hybrida, Pall</i>	The Marsh Tern	1

THE POISONOUS SNAKES OF THE BOMBAY
PRESIDENCY.

By H. M. PHIPSON, C.M.Z.S., Hon. Sec.

(Read at the Society's Meeting on 5th September 1887.)

A FORTNIGHT ago one of our local newspapers stated that there were not more than three, or perhaps four, poisonous snakes in the Bombay Presidency. I felt that we ought not to allow such a statement to pass unchallenged, especially as our own collection furnished evidence that nine poisonous snakes, at least, are to be found in the Presidency, and that according to the greatest authority on the subject, Dr. Gunther, a tenth, which we have not as yet obtained, is

an inhabitant of the Deccan. I consequently gave the *Times of India* a list of the poisonous snakes in our possession, all of which had been killed in this Presidency; a list which, I think, reflects great credit on this Society, when the short time during which the collection has been got together is taken into consideration. Some of the measurements we were able to give have already attracted the notice of the press in other parts of India, and I therefore think it would be of interest to the members present if I were to draw their attention to the specimens we possess of these particular snakes. We have, you will observe, specimens of the following poisonous snakes, all of which were killed in this Presidency:—

Colubrine.—1. *Ophiophagus elaps*. 2. *Naga tripudians*. 3. *Bungarus arcuatus*. 4. *Callophis trimaculatus*. 5. *Callophis nigrescens*.

Viperine.—6. *Daboia elegans*. 7. *Echis carinata*. 8. *Trimeresurus anamallensis*. 9. *Hypnale nepa*.

1. We will take, first, the great Colubrine snake, the *Ophiophagus elaps*, the “Hamadryad” or “King Cobra,” which is probably the largest poisonous snake in the world. I say probably, as there is one in New Guinea, *Lachesis mutus*, a viperine snake belonging to the Crotalidæ, which is said to reach 14 feet in length. Fortunately, the Hamadryad is not very common. Dr. Gunther, the well-known ophiologist, says that the Hamadryad is found in all parts of the Indian Continent, in the Andamans (where I hear it is eaten by the natives), the Philipines, Java, Sumatra and Borneo. As its name implies, it feeds principally on snakes and other reptiles. Owing to the fact of its expanding a “hood” it is frequently mistaken for a cobra, but, as you will see by comparing the specimens before you, the plates or shields on the head of the Hamadryad differ materially from those of the cobra. According to Sir Joseph Fayrer, the natives of Bengal call it the “Sunkerchor,” a “breaker of shells,” but he gives no explanation of this name. The snake-men about here do not appear to know the Hamadryad, but it is, undoubtedly, an inhabitant of this Presidency. We have received a skin of one from Carwar measuring 12 feet 6 inches, and another from the Goanese Ghauts which is 15 feet 5 inches in length. Major Beddome, of Madras, says he has killed one nearly 14 feet near Cuttack in Bengal, where it is common. A few years ago one was caught in the Konkan by Mr. Bulkley, who tried to take it to England alive, so we have ample proof of its occurring in this part of India.

2. *Naga tripudians*, the Cobra, is too well known to need description. It is found all over India up to 8,000 feet in the Himalayas. There are a great number of varieties, differing in colour and markings, many of which are, you will see, figured in Sir Joseph Fayrer's *Thanatophidia of India*. The natives, who give separate names to these varieties, maintain that they are distinct species, and that they differ considerably, not only in appearance, but in their habits. The natives are, I need hardly say, profoundly ignorant in such matters.

For instance, many of them insist that all the hooded cobras are females, and that the male has no hood and is harmless. Their "male cobra" is nothing more than the common Dhâman (*Ptyas mucosus*), the Indian Rat Snake. They also state, in support of their theory, that the Dhâman is proof against the poison of the cobra, but this has been shown over and over again not to be the case. The cobra lays from twelve to twenty eggs, once a year, during the rains, and the young show signs of their venomous power at a very early stage. Those hatched in this Society's rooms last year killed a small Malay python (*P. reticulatus*), which was placed in their cage a few days after they were born. They attacked it at once, biting it viciously across the back. The Python showed great signs of fear, but made no attempt at retaliation. It was at once removed to another cage, but died in about twelve hours. We have, as you see, many specimens of the cobra in our collection, amongst which is a young one preserved in the act of emerging from its egg. In this specimen, the foetal tooth with which the young snake cuts its ways out of the strong parchment-like egg, can be clearly seen with a magnifying glass. This foetal tooth is shed as soon as it has served its purpose, and is, in fact, expelled the first time the snake darts out its tongue, which it usually does directly its head appears from the egg. Some of these little cobras thrived for several months on young lizards, but the others would not feed, and died in about two months. They measured $7\frac{1}{2}$ inches when born, and were very fat. At the end of the two months they had lost all their plumpness, but had increased their length by nearly $1\frac{1}{2}$ inches. It is very extraordinary that the original nourishment obtained from the egg should be capable of sustaining them for so long a period. The cobra is an exceedingly *timid* snake, but it can be easily tamed with kindness, as you know from the living specimen in the Society's rooms. It is worthy of note that the cobra is about the only poisonous snake which those arrant impostors, the so-called "snake-charmers,"

ever have anything to do with. I never lose an opportunity of fraternizing with these gentlemen in the hope of obtaining specimens we are in want of, but on no occasion have I ever seen any other poisonous snake in their baskets except the cobra. The explanation of this lies, I believe, in the fact that the cobra is the only poisonous snake which can be easily and safely handled. You have only to attract its attention with one hand, while you seize it in the middle of the body with the other, and the snake is yours. It strikes in every direction, *especially at any moving object*, but it never seems to occur to it to turn and bite the hand that is holding it, as almost all other snakes would do at once. The snake-charmers have from time immemorial made great capital out of the knowledge of this simple fact. Their performances with the cobra are known to you all. The snake is taken from the basket, when a slight slap across the back brings it at once into its striking posture. *It is the constant movement of the musical instrument in front of the snake that keeps it erect, and not the noise produced.* Snakes have no external ears, and it is very doubtful whether the cobra hears the music at all. The vipers, which are far less timid, cannot be frightened in this manner, and consequently they are not used for these performances. The snake-men will tell you that the Daboia, the largest viper, or adder, of the East, is a dull snake with no ear for music, and it is interesting to note that they have evidently been repeating this nonsense ever since the time of David—*vide* Psalms LVIII.—“like the deaf adder that stoppeth her ear; which will not hearken to the voice of charmers, charming never so wisely.”

The cobras in the Society's rooms feed freely on young rats, birds, and toads.

3. We next come to the Krait (*Bungarus arcuatus*), which is also a very well-known snake. It is exceedingly poisonous, and is common in nearly all parts of India. We have a number of specimens in our collection from the Bombay Presidency and from Bombay itself. I have lately received two from Malabar Hill. The one contained a “brown tree snake” (*Dipsas gokool*), and the other a Dhâman (*Ptyas mucosus*), so that we have good evidence of its snake-eating propensities. The dark variety of the common and harmless *Lycodon aulicus* is, you will observe, very like the Krait in outward appearance, but you can readily distinguish the Krait by the large hexagonal scales down the centre of the back. The Burmese Krait (*Bungarus fasciatus*), of which we have several

beautiful specimens, is not found, I believe, in any part of this Presidency, although it occurs in parts of Bengal and Lower India.

4. Our fourth poisonous Colubrine land snake is the *Callophis trimaculatus*, which does not possess any popular name that I am aware of. It is a ground snake, and lives chiefly on other small snakes. Dr. Gunther says that the Calamariæ, which they much resemble in appearance, are their principal food. This snake, although so small, is undoubtedly poisonous. We have two specimens, one from the Konkan and the other from Bandora.

5. I have just received a telegram from Mr. G. W. Vidal, C.S., to the effect that the specimen of *Callophis nigrescens*, which he deposited some time ago with the Society, was found by him in Carwar, thus adding another poisonous snake to the list of those found in this Presidency. The upper parts of this snake are black, and the lower uniform red. It grows to about four feet in length.

6. We now come to the Viperine snakes, first and foremost of which is the deadly *Daboia elegans*, the Gunus of the natives, known to Europeans in India as the Chain Viper and in Ceylon as the Tic Polonga. It is common in the Island of Bombay, and is, I believe, found in most parts of the Presidency. According to Sir Joseph Fayrer's experiments, the poison of this snake, although very different in its action, is almost, if not quite, as fatal as that of the cobra. It has, as you will observe, exceedingly long fangs and a good supply of spares ones behind ready to take the place of those in front should they be broken. From its sluggish habits, its fierceness, and the great length of its fangs, it is to be dreaded, I think, more than any other snake in this country. Most of the authorities give 50 inches as its length, but we have the head of one, killed by Mr. J. C. Anderson, in Hurda, Central Provinces, which was 61½ inches. Judging from the size of the head, and the evidence of the piece of string with which the snake was measured, there is little doubt that the correct length has been stated. Like most of the vipers it is difficult to keep in confinement, but it is very tenacious of life, and has been known to live for a whole year without food. It is an exceedingly handsome snake, especially when young, as you will see from the specimens before you.

7. The only other true viper in this country is the *Echis carinata*, known here as the Phoorsa and in Sind as the Kupper. We have received it from many parts of the presidency, and in some districts, Rutnagherry for instance—it is found in great numbers. I have

never heard of its being killed in the Island of Bombay, although the harmless "brown tree snake" (*Dipsas gokool*), which somewhat resembles it, is often sent to me as a Phoorsa. You will readily distinguish them, as the head of the Echis, like all vipers, is covered with scales, whereas that of the *Dipsas gokool* has plates or shields. Dr. Gunther was, when he issued his book on the Indian Reptiles, under the impression that the bite of this little viper was not absolutely fatal, but it has since been proved that in certain districts the mortality from the Phoorsa is very great.

8. The *Green Tree Viper* (*Trimeresurus anamallensis*) belongs to the family of Crotalidæ, or Pit Vipers, so called from a curious pit or cavity between the nostril and the eye, the use of which is not known. The dreaded rattle-snake of America belongs to the same family. There are eight species of *Trimeresuri* in India, but we have, at present, in our collection, only *T. anamallensis* from the Bombay Presidency. It appears to be common on the Ghauts, as we receive many from Khandalla, Egutpura and Mahableshtar. Dr. Gunther states that another species, *T. strigatus*, is found in the Deccan, and I hope before long some of our up-country members will be able to send us one in order that we may have specimens of the ten poisonous snakes, which are now known to belong to this Presidency.* It is just possible that an eleventh, *Peltopelor macrolepis*, may also occur in the Canarese jungles, as it is said to be common a little further south.

9. We now come to *Hynale nepa*, or the Carawala, which was found in Carwar by Mr. G. W. Vidal, C.S. Its head-quarters are in Ceylon, where it is greatly dreaded, but, like so many of the Ceylon fauna, this snake is to be found along the Malabar Coast, but probably not further north than Carwar.

I have to-day only dealt with the poisonous land snakes of this Presidency, but all the true sea snakes are, as you know, poisonous. I may state that we have at present in our collection specimens of the following species :—

Hydrophis diadema. (Gunther.)

Hydrophis robusta. (Gunther.)

Hydrophis curta. (Gunther.)

Hydrophis aurifasciatus. (Murray.)

* A specimen has since been received from Mr. H. S. Wise, which was killed in Carwar.

Hydrophis Phipsoni. (Murray.)
Hydrophis Guntheri. (Murray.)
Hydrophis Lindsayi. (Gray.)
Hydrophis chloris. (Daud.)
Entrydrina bengalensis. (Gray.)
Pelamis bicolor. (Daud.)

THE INDIAN HEPATICÆ.

By SURGEON K. R. KIRTIKAR, I.M.D., Fellow Soc. Myc.
(France), M.R.C.S.

(Read at the Society's Meeting held on 5th September 1887.)

ON various former occasions I have brought to the notice of the Society that the subject of Indian Cryptogamia, or flowerless plants, has yet to be investigated; that in exhibiting before the Society, from time to time, my specimens of fungi and algæ growing in and around Bombay, I have failed to derive any assistance from works on Indian Botany; and this I repeat on the present occasion. This fact is borne out by the independent testimony of a distinguished Indian Botanist, Dr. Wellington Gray, whose observations on the Botany of the Bombay Presidency, as embodied in Vol. XXV. of the *Bombay Gazetteer*, recently published, contains the following remark:—He says, “The species belonging to the indigenous flowerless plants have never yet been fully described or investigated, and there are doubtless multitudes of new species still to be discovered.” And this is literally true. Take up any book on Indian Botany,—Professor Oliver’s “Indian Botany,” for instance. Considering that Professor Oliver has never visited India, and that the book written is from dried Herbaria, and from species of Indian plants growing in England—in the Kew Gardens—the work is admirable. In that book, containing nearly four hundred pages, however, the Cryptogams are disposed of in twenty pages. No mention is made of the order Hepaticæ, specimens of which are exhibited this evening. In Gregg’s text-book of Indian Botany, recently prepared for the Hooghly College in Bengal, a merely passing allusion is made to the order Hepaticæ. In Roxburgh’s “Indian Flora,” recently edited by Mr. Clarke, there is a chapter added on the miscellaneous Cryptogamia. No mention is made of the Hepaticæ. Now I do not mention all this to show the magnitude of the result of my researches in that neglected branch of Botany, but rather the magnitude of the difficulties I have had in investigating the subject. I have to depend on my own resources entirely. Considering that one is accustomed to

have information at second-hand in this country, where original facts have to be recorded, great care and caution, and accurate and repeated observations are necessary. I urge the fact of the absence of all previous information more in extenuation of the defects of my own paper than a desire to show what others have left undone. I urge this point also with a view to rouse the interest of those members of the Society who are given to Botanical pursuits, inasmuch as there appears to be an unending field for very entertaining and useful research. For the materials one has not to go very far. In the rainy season we tread these plants under our feet, the carriage wheels daily pass and repass over them near our stable door and our garden gate. They invade our eye as we stand by the garden wall, with the rich beautiful green of their foliage which the artist's pencil can never imitate. They grow on the outer side of our flower pots in isolated or close packed circlets. On dilapidated walls they are more constant, growing from year to year, drying after the monsoons. This, then, is their habitat. A moist ground or a damp spot is necessary for their growth, and they are in their prime in the monsoons. The ground may be clayey, sandy or chunam-mixed. With regard to their general appearance they are leafy expansions—foliaceous. The roots of these plants are delicate and silky, so entering the ground as to form a web or network, thin and friable, matted with the ground, rendering it difficult to preserve the plant or set it free from the matrix-earth in which it grows. Why the order to which the three plants belong is called hepaticæ I do not know. It is possible that from the lobed condition of the frond and its resemblance to that organ in general shape the name hepaticæ might have been given. Otherwise there is nothing in common between the liver and the liverworts. The natural order hepaticæ is allied to the mosses from which it differs in many respects, mainly in this, that in most of the liverworts there is no stem, but simply a patch of green membrane spreading over the ground whereas in the mosses there is a stem often much branched. The hepaticæ are sub-divided into the *Liverworts* or Marchantiaceæ, the *scale mosses* or Junger-manniaceæ and the *Crystalworts* or Ricciaceæ. The hepatics, especially plants of the last sub-division, are often confounded with lichens, but the lichens can be easily distinguished by even a cursory microscopic examination. The plant depicted in Fig. I., Pl. No. I., is of dark green colour. The surface markings of the frond are visible distinctly under an ordinary magnifier. Under the micro-

scope the frond presents a reticulated surface, on the upper surface of which there are open spaces representing the "stomata," or breathing spores. The frond is elongated and presents a deep groove, dark green in colour, and corresponding to the midrib of the leaf of a phanerogam. The fronds branch dichotomously, and a vertical section presents a figure of eight appearance. The cells are compressed, spherical, and give the appearance of a hexagon by mere optic illusion. There are abundant chlorophyll granules in the cells, closely packed. The roots arise from the lower surface of the mid groove. They are soft and filamentous. There are also some fine radical hairs; the fronds are succulent and not imbricated. The margins are entire. The sporangium which contains the spores is situated in the frond and is ovoid in form, containing thickly-packed brown black spores of a very definite character.

In other parts of the frond there is the commencing formation of the sporangium, where the dichotomous cell division is well marked. The full formed spores are honeycombed in appearance. No elators or spiral fibre, have been seen at all the examinations of the plant. The plant is, therefore, consigned to the sub-division or "Alliance," as Lindley calls it, of Ricciaceæ, the diagnosis lying between this sub-division and Marchantiaceæ, in which elators exist as a matter of necessity. The plant depicted in Fig. II., Pl. No. I., is also consigned to the subdivision Ricciaceæ. The colour is brighter than that of plant Fig. I. The fronds are more delicate and less succulent. The margins are crenulate and lobed. The stomata are visible on the upper surface even to the naked eye. The roots are finer and more numerous, coming not only from midribs, but also from the under surface of the frond as a whole. The fructification of the plant has not been observed. Under the microscope the structure of the chlorophyll cells is much more delicate and oval. The stomata are strikingly sharp and hexagonal. The plant depicted on Pl. No. II., Fig III., is peculiar in its arrangement, the tendency being to form circles by the growth of fronds all round from a central point. The colour is dark green, tinged brownish yellow. The tissue is crisp and friable, midway between that of plants figured Nos. 1 and 2. The margins are crenulate, and the greater the number of fronds packed the greater the amount of crenulation. The cells forming the substance of the frond look polygonal and compact, having large thickly set chlorophyll granules in various stages of

development. This plant also belongs to the Alliance Ricciaceæ. The three plants require naming.

WILD HORSES.

BY VETERINARY-SURGEON J. H. STEEL, A.V.D.

(*Read at the Society's Meeting on 1st August 1887.*)

IN bringing forward for consideration by the Society some further questions about horses, I trust that I shall not be thought to unduly force a hobby on my hearers. I feel assured that to a large number of our members there is no lower animal more interesting than the horse, and none about which details will be more acceptable. Viewed from the high scientific standpoint no animal-being, save perhaps man himself, could be studied with more prospect of sound results and valuable generalisations. The horse is to us the best representative of hoofed animals and vegetable feeders, and to anatomists he is what Oscar Schmidt describes in the following passage:—"The best known example of this kind of an isolated form of mammal is the horse and its relatives, the genus *equus*. The descriptive zoologist places it by the side of the two-hoofed animals. Yet the difference between the one-toed horse and the two-toed oxen and stags remains completely unexplained. Besides this the more perfect dentition of the horse stands in sharp contrast with the reduced dentition of most of the ruminants, which lack the upper incisors; the only point of connection would seem to be the camel, which again has a much fuller dentition. Nevertheless, the horse remains a phenomenon so peculiar within itself that descriptive zoology has always classed the horse in the order of the two-hoofed animals."

This evening I want to consider *wild* horses in some of their practical and scientific bearings, and naturally the first question which arises is, *whether there is any such creature as a wild horse?* This is rather a startling question when we consider that in at least four out of the six continents horses in a free state are found living only to a very limited degree influenced by man and most certainly not in a state of domestication. The mustang

of Mexico, the wild horse of the Pampas of Southern America, the brumbie (or "Scrubby") of Australia, and the terpan of Tartary are to all intents and purposes "wild," but it is very doubtful whether, in the naturalist's sense of the term, they are truly feral. As regards the brumbie of Australia it is certain that he is the descendant of imported horses which strayed within recent years; the enormous numbers of horses of the Americas are known from historical records to have resulted from animals imported by the Spaniards and others from Europe. The horse of Tartary or Central Asia has no such historical record, and yet we find that naturalists of good scientific reputation almost without hesitation state that he must have resulted from domesticated animals which had strayed. Youatt says his origin has been clearly traced to horses that were employed at the siege of Azof in 1657, but it is doubtful if he refers to the true Mongolian wild horse. Certainly there are in this region large horse runs, the property of the Imperial Chinese and other Governments, and undoubtedly under not very perfect management horses stray and become lost or are enticed away by their free comrades, as is the manner of wild horses (though Youatt says, I know not on what authority, the wild horses of Tartary quickly destroy any domestic horse which comes into their power), but we have no distinct and definite evidence on this question as to whether in Central Asia the original wild stock of horse still exists in the condition of its native proprietors. We may consider the evidence fairly conclusive concerning the horses of America and of Australia, but in the case of those of Central Asia it is not proved whether the breed has descended in unbroken pedigree through ancestors which never have been tamed, or whether at some time or other in the history of his race it has yielded to the power of man. Tradition and scientific surmise (we cannot speak of it in stronger terms) point to Central Asia as the aboriginal abode of the horse, but this can by no means be proven, and it is certain that fossil horses are found in both Europe and America equal in age to those of Asia, thus tradition dating even from extremely remote periods can have little importance attributed to it, and it is much to be doubted whether the scientific view which has hitherto been adopted will hold ground against some most recent observations in this connexion. Darwin's statement that "no aboriginal or truly wild horse is *known* to exist" must still be held as explaining the exact position of this question, but we must supple-

ment it by stating "it is not certain that truly wild horses do not exist."

Our evidence in elucidation of this matter must, as we have seen, be brought to bear on Central Asia; unfortunately, it cannot be accepted as conclusive, being based on the statement of travellers, which are in each case that I can find only second-hand and through an interpreter, who possibly was well aware his employer would be very glad to hear there was such a thing as a wild horse. The latest information on this subject apparently is that in Prejevalsky's Mongolia, from the English edition of which, edited by Yule, we find that Father Hyacinthe, writing of Middle Mongolia, speaks of wild camels, wild mules, wild asses, and wild horses. Sir D. Forsyth, in a printed report of his last mission to Kashgar, mentions, apparently from native information, wild horses mixed with wild camels. These "horses" were probably Kulans (Turki for Kyang) "this equivoque is probably at the bottom of many mentions of wild horses; but I would not say so positively." (Yule.) Thus Dr. Bellew in his "Kashmir and Kashgar," p. 400, speaks of a place called Kulan Uldi, which means "The wild horse (ass?) died;" and elsewhere he speaks of meeting a herd of six or seven Kulan or Kiang. Jerdon tells us that Cunningham calls the Kyang the wild horse, and states that it *neighs*. Now the Kiang or Kulan is an animal about which there is much debate as to whether he is a horse or an ass. He is bigger than most asses, has a voice which some observers call a neigh and others a bray, his ears are much smaller than those of most asses. He is described by Prejevalsky as "in appearance closely resembling a mule." His importance to us at present is that we must distinctly understand that he is not here considered a wild horse, and all the statements of travellers who seem to have considered him as such must be excluded from our evidence. It would almost be right, if practicable, to exclude all hearsay evidence, for it seems that in Central Asia the Mongols often confuse the wild ass and the wild horse, and mention the two animals under the same name, just as in some parts of India there is only one name for sheep and goats. The only fairly exact and positive evidence I can find is that of Prejevalsky (p. 169, vol. II.), who says:—"The natives repeatedly told us of the existence of both wild camels and wild horses, and described them fully Wild-Horses, called by the Mongols *dzerlikadu*, are rare in Western Tsaidam, but more numerous near Lob Nor. They are generally in

large herds, very shy, and when frightened continue their flight for days, not returning to the same place for a year or two. Their colour is uniformly bay with black tails and long manes hanging down to the ground. They are never hunted owing to the difficulties of the chase. * * * The plains of Tsaidam are 1,700 feet below Kokondi, and on this account the climate is warmer. The absence of water also tends to increase the heat."

Thus we must conclude that the evidence is slightly in favour of the existence of wild horses in Central Asia, but we have no evidence as to his pedigree in relation to domestication.

The Shetland pony is practically the wild horse of the British Isles, and illustrates on a small scale the peculiarities of horses which have gone wild. He is evidently not the British horse exported by Julius Cæsar as "being powerful, and by stature and training well suited to war."

The question now arises as to *whether all horses of the present day have come from one original stock or have been developed on parallel lines*. Wild horses certainly existed in the distant past, and it behoves us to inquire in what respects they resembled and how they are related to those of the present day and also our domesticated horses. The original horse may not now exist in a wild state, but he must be lineally represented by our horses, and his comparison with them must result in important observations. The question of origin of the horses of America is soon settled. As Oscar Schmidt shows, the *Palæotherium* soon disappeared in South America, but became very numerous and continuously developed in North America as in Europe and Asia. Marsh considers that a true equus appeared in the Upper Pliocene, and this in the post-tertiaries roamed over the whole of North and South America, but very soon became extinct. Schmidt concludes that "the true horse of our day never existed in America before its importation." The primitive equine forms of America are thus supposed to have been crushed out by the ice formations of the Diluvium. Among the forms thus lost must be included *Equus andium* (Branco) as found in the volcanic tufa of Ecuador, probably also the coeval diluvial pampas horse, the cave horse of Brazil, and the *Equus curvidens* (Owen). In *Equus andium* it has been observed that the eyes must have been situated much deeper than in *Equus caballus*, in which the orbit has moved further back. Altogether, concludes Schmidt, the American members of the genus horse have never advanced so close

to our present horse as the diluvial members of the European family did. Forsyth Mayor shows that *Equus stenonis* of the quaternaries of Upper Italy contains all the intermediary stages between *Hipparion* and *Equus*. Schmidt continues the argument on this important subject, on which he is not always quite clear, by drawing attention to Goethe's observations on the backward position of the eye in the horses of the Parthenon; they are far back against the ear, and, says Goethe, this was, though the artist may not have known it, the condition present in the primeval horse.* It must be remarked, however, that evidence tends to show that of the cave horses some had eyes far back and some in the position of those of the present day. These cave horses were useful to man but not domesticated; they lived in the reindeer period, and found their most deadly foe in man, who pursued and killed them for flesh food. As yet all conclusions as to their make and shape seem to be derived from the work of a Landseer of the stone period, who drew a picture of a man, horse, and a mammoth in recognizable outlines on pieces of ivory. The horse seems rather a small one and has a big head. This curious record of art in the nursery stages of the world's history must not be considered from the severely artistic point of

* Youatt's views on conformation of the Parthenon horses will be read with interest as bearing on the text:—

"There is a considerable difference in the form and action of the two horses. The right hand one, and the foremost of the two, is sadly defective in the portions of the forearms which we are permitted to see. The near one is poorly supplied with muscle. The off horse is out of all keeping. The large ears placed so low; the clumsy swelling of the lower part of the neck; the bad union of it with the breast; the length and thinness of the barrel compared with the bulk of the fore parts, notwithstanding the natural and graceful position of the hind legs, show no little want of skill in the statuary. The more animated head of the left and hinder horse, the inflated nostril, the opening of the mouth, the form and prominence of the eye, and the laying of the ears, sufficiently confirm the accounts which we have of the spirit—sometimes untameable—of the primitive horses. The neck, however, is too short, even for one with these immense forehands; it springs badly out of the chest, the shoulder is very defective; but the forearms, their expression and their position, are exceedingly good; the long forearms and short leg are excellent; and so are the off fetlock and foot; but the barrel is deficient, the carcase is lengthy, and the hind quarters are weak compared with the forearms. The beautiful execution of the riders * * * shows that they were portraits, as probably the horses were to a very great extent. These animals remind us of some of the heavy ones of the present day particularly; they have the beauties and defects of many of the modern Holstein horses; they are high, but perhaps heavy actioned; courageous, spirited, possibly fierce. They exhibit the germs of many future improvements, and, taken altogether, may be examined with considerable pleasure, remembering that they are horses of nearly 2,300 years ago. Art has done much for the horse since that period, but the countenance and figure of the human being were at that time perfect. These horsemen have not even the switch to guide the animal; but they are holding by the mane with the left hand, and are evidently directing the horse by pulling the mane, or pressing the neck with the right hand a little higher up." It looks more as if the mane were not held at all but guidance made by pressure with the forefinger of either hand on the corresponding side of the neck. Youatt seems slow in giving the artist credit for as much faithfulness in representation of the horses as of the men; of course he may not have been an "animal" artist.

view, but much as we would a child's production in the present day, in no way detracting from the credit of this earliest of the world's known artists.

It seems to be generally accepted by British naturalists that the horse of the present day came from one original stock. This was the view of Cobbold. (Museum of Natural History.) Martin Duncan says: "All true horses are descended from *Equus caballus*, a well established species," and so on. Schmidt combats the view of the domesticated horse having a single origin from the original wild stock. He shows reason to believe that, perhaps, some of the slighter breeds of the present day have resulted from the taming of the broad-browed horses of Southern Germany, but certainly some of the tamed thin-boned horses of the bronze period were of Asiatic origin and introduced by nomads. Ecker also considers that of the two breeds of German horse described by the Roman writers (Cæsar included), the small and hardy native race was indigenous, but the *Equus caballus germanicus* (of Sanson and Piétrement), the heavy horse of Central Germany, was an imported animal, probably of Asiatic origin, tamed and introduced by nomadic tribes in pre-historic times.

Two groups of domesticated horses have been distinguished: (1) the Oriental, with well developed cranium, forehead broad, face small, inner side of crescents of upper molar with but few enamel folds, limb bones graceful and firm; the Arab, for example. (2) The Occidental (Franck of Munich), face much larger as compared with cranium, long narrow skull, forehead narrow, rims of orbits somewhat forward, enamel folds of crescents of upper molars very complex, limb-bones thick and massive, and of less dense structure than those of the Oriental. Nehring shows that the diluvial horse of Central Germany—found at Westenregeln near Magdeburg, at Thiede (Brunswick), also along the Rhine in the neighbourhood of Remagen—presented all the characteristic features of the Occidental horse. Frass has described a Schussenried breed of fossil horses, found in S. W. Wurtemberg, with very broad foreheads and graceful limbs. In France, Sanson and Piétrement have arrived at some very interesting conclusions with regard to the horses in relation to the domesticated races of the present day. Piétrement shows that it is untenable that the horse of Solutré (a primeval form of the reindeer period, which abounds in caves near Macon, north of Lyons) was tamed and domesticated, but Schmidt concludes that in it we

very likely have one of the races which subsequently became domesticated, and which left descendants that probably still exist, such as the long-headed Ardennes horse and the Carmague small semi-wild horses of the Rhone delta. Also in Alsace there is a race of large ponies which Schmidt thinks probably the last offshoots of a race of this kind; they have large and ugly heads, well formed bodies (although no care whatever is exercised over their breeding), and their limbs are powerful. They are good-natured, docile, and very strong in moving weights. The sum of these observations and arguments is hardly conclusive as establishing that horses were domesticated locally; yet it seems to be clearly established, however, that there were at least two well-marked varieties of the cave horse, the large-limbed, narrow-headed form and the small-limbed, well-shaped, broad-skulled animal. These variations we must to a very large extent put down to local conditions; the experience of breeding domesticated animals, even during the short period of half a century, shows that the large size of the variety and narrowness of the skull depend on the amount of food obtainable within a limited range of grazing, whereas compactness of bone, smallness of face, and greater relative development of the cranium result from opposite conditions, as may be illustrated by comparison of the skull of a Lincoln sheep with that of a Southdown. The result of scientific research so far has, we may conclude, supported what we may term the common-sense conclusions with regard to horse domestication. Of the methods of capturing the horse or wild ass in the present day* almost all would not be practicable to our earliest horse-taming forefathers, for they naturally could neither adopt the corral nor lassoing system; also they had nothing on which to ride down horses. Either they captured the very young, or else they cured animals captured alive after being maimed with axes, arrows, or other primitive weapon. Certainly they got many horses for food in those days, and probably, as the Bikanir hunters are described as doing now, they caught the foals and tamed them. Doubtless,

* Methods of capture of wild horses :—

1. Corraled; thrown by means of lasso round fore legs, saddled, bestridden, and then let go and spurred until controllable.
2. Loose wild horse lassoed and jerked off legs, then ridden.
3. Ridden down by relays of horses.
4. Bewildered by falcon flapping wings in the eyes.
5. Brought down and stunned by a rifle shot behind the ear.
6. Capture and rearing of foals or of wounded horses.

from the earliest times migrations of equine animals have taken place; it is supposed that in the period of the early tertiaries such a migration occurred to America, and that there was also a very early migration from Central Asia in other directions, as to the western limits of Europe. Doubtless also early human migrations influenced the spread of the horse in such a way that even the special races of different countries have from time to time had constant admixture of foreign blood both in the pre-historic and historic periods. Yet we cannot believe that so obvious a process as domesticating horses did not take place simultaneously in different countries and so act as an important factor in production of local breeds. All methods of the present day are but modifications of those of the past, in this as in other matters "there is no new thing under the sun." I cannot conceive that given men of a number of different races with horses to hand and constantly killed as food, it would occur only to the Mongolian to endeavour to domesticate so tractable an animal! Martin Duncan shows that the domesticated horse was first known in the Swiss Lake period, and must have been driven in the bronze period, for bronze bits have been found in France and Italy. He quotes Hamilton Smith's conclusion that the first domestication of the post-diluvium horse was achieved in Central Asia, or commenced nearly simultaneously in the several regions where wild animals of the horse form existed; the latter seems the most tenable view.

With regard to *climatic and physical conditions under which wild horses live*, the Steppes of Tartary are described as great treeless plains at considerable elevation. The Kiang inhabits the Thibetan plateaux some 15,000 to 16,000 feet above the sea level, and the Mongolian wild horse of Prejevalsky is found on the plains of Tsaidam, some 1,700 feet below the Kokonor Steppe. In Bolivia the llanos are described by Spence as a series of enormous level tracts watered by navigable rivers and covered by verdant turf, where vast numbers of mules, horses, and asses pasture. These tracts are subject to floods during which the horses take refuge on table-lands, which form, as it were, islands in the flood, and the mares (with their foals) may be seen swimming about in the water browsing on the tops of the long grass projecting over the water. Wide plains of pasture, undulating and even hilly, are suitable for the wild horse, running streams and perennial grass are advantageous to him, but he at times undergoes great straits both for food and water. The arguments with regard to the nature of the land

on which the fossil horses were found have been rather in a circle. It has constantly been assumed that the occurrence of remains of horses implies vegetation and climate resembling those of the Steppes, or, again, that wide grassy plains imply suitability for horses. As a matter of fact, we know that horses thrive in a remarkable variety of climates and on many soils, but a tendency to dryness with heat is favourable, heat with moisture and an alluvial soil are conditions unfavourable in the extreme, and indeed often suffice to produce extermination. When one comes to think of it and to compare America and Australia with South Africa, the question naturally arises, why have not horses gone wild in the latter place, where many must have escaped, just as in Australia and America? If we may judge from the presence of the zebra, quagga, and Burchell's zebra, the climate and soil is everything that could be required for the production of a wild race in South Africa, and yet one has not appeared! It seems to me that this is the result of one of two causes, or, perhaps, of a combination of each. The South African territory was originally occupied, indeed fully populated, by equines before importation of the horse, and the latter has had to contend with that terrible enemy, the Horse Sickness, not to mention animals of prey and such small but serious foes as the Tsetse fly. Youatt seems to have had a suspicion that wild horses were found at the Cape. He had probably heard the Dutchmen and other travellers talking of the Wilde Paarde, the Boer name for the zebra. He says: "At the Cape of Good Hope we find that the horse, if a native of that country, is only occasionally seen in its wild state. * * * The wild have long disappeared from the colony, and we have no authentic record that any of them were even taken and attempted to be domesticated." This was written about fifty years ago. Darwin noted some curious facts about the non-spread of horses in the Falkland Islands to the degree that might have been anticipated. Firstly, he attributes some influence to the fact that the hoofs, on account of softness of the soil, become overgrown, and so limit progression; secondly, the stallions insist on the mares accompanying them often before the recently born foal is able to move sufficiently fast.

Wherever the horse runs wild, there seems to be what we may fairly consider as a *recurrence to ancestral manners*. Each stallion has his following of mares ranging from a few up to forty or even fifty, and these parties may be separate or banded together into

herds of considerable size sometimes, it is said, 400 strong. The young and weak males remain with but a scanty or even no following. The stallion has to maintain his supremacy by frequent combats, which especially occur at certain seasons of the year. Youatt mentions frequent combats between different *herds*, but the general evidence tends only to the occurrence of contests for supremacy between different stallions. The animals are suspicious in the extreme, swift of flight, but bold in defence with tooth and heel in emergency. They range extensively in search of pasture and water, and when hard pressed by danger or famine, the herds break up. It is said that each troop has a leader and implicitly obeys him, he is the first to face danger and to give the hint to fly; when hard pressed, the horses form a ring, with the mares and foals in the centre, and defend themselves vigorously with their heels, or they close in on their opponent in a dense mass and trample him to death. A favourite proceeding of these animals seems to be the tempting of domesticated horses to join them, a source of much annoyance to breeders in Australia, as also is the invasion of their runs by wild stallions, which vitiate select breeds in a most annoying manner. Wild horses are sagacious in avoiding sportsmen, keen of scent, and vigilant. Many wild horses in America are found with saddle marks, and I have seen the skull of an unfortunate individual with each side of the lower jaw almost cut through by pressure from a halter which he wore when as a youngster he escaped from captivity.

With regard to *shape*, it is much to be regretted that from Job even unto Byron, our authors and travellers have thought advisable to view the horse in a state of nature from the poetic rather than from the practical side. We have very few "horsemen's descriptions" of these animals in so far as I can learn, and the pictures given us are either over-artistic, evidently taken from stuffed specimens, or not reliable. The brumbies are described by Anthony Trollope as "perfect marvels of ugliness," and elsewhere we are told that they are small, hardy, and remarkable for the excellence of their feet, but seldom worth the trouble of capture and training. The picture before us of the wild horse of Tartary looks like that of a youngster. Its most striking features are a most ugly head, with coarse Roman nose and convex forehead, short muzzle, little cranium; head badly set on, no shoulder, deficiency of barrel, ugly quarters, round short hocks, upright pasterns, and great length below the knees and hocks. To counteract these bad points there is power in the quarters, arms,

and thighs; the animal is well ribbed up and the feet look good. The picture of the mustang exhibited reminds us of a thoroughbred circus horse let loose, and is evidently a flight of imagination on the part of the artist. Youatt, in speaking of the wild horse of South America, mentions him as possessing much of the form of the Spanish horse from which he sprang, as not remarkable for speed, but wonderfully enduring, and knowing no pace between a walk and a gallop. Spence in his "Land of Bolivar" speaks of them as "small, strong built, and capable of enduring any amount of fatigue."* Unsoundness of hoof of the wild horse is not often seen, but its general infrequency under natural influences contrasts markedly with the terrible frequency of foot lameness, in spite of all care, among domesticated horses. It teaches us the important lesson to get the natural wear and bearing as much as possible, but must not be misled, as by some, into teaching that the domesticated horse should go unshod. According to the latter argument pushed to its logical conclusion, our horses should be fed only on grass and never be groomed!

The original colour of the horse has been a subject of much debate, and seems to have been pretty generally accepted that the primitive horse was *dun*. Martin Duncan says the evidence on this point dates back as far as the time of Alexander the Great: that the wild horses of Western Asia and of Eastern Europe are *dun*, and that the *duns* much predominate among some unmixed breeds, such as those of Hungary and Norway.† It will be seen that the arguments of the learned professor are weak in the extreme. Whether or not the historians of Alexander the Great *saw* wild horses I can't say, but I consider it extremely probable that they saw only wild asses of Persia, Assyria, Scinde, and even, possibly, the Kiang in the Punjab. Again, I doubt very much whether colours were recorded with as great discrimination by those histo-

* There was nearly half a century between when Youatt and Spence wrote; the stamp of the South American horse may materially have altered in that time.

† I am indebted to Mr. F. Stockinger, Consul-General for Austro-Hungary in Bombay, for the following interesting information on Hungarian horses, as conveyed to me in a letter received since the paper on "Wild Horses" was read:—"The Hungarian is certainly one of the best mixed breeds on the surface of the earth, as the Government and private persons have for more than a century imported Arabs, English, Spanish Norman, and other blood for breeding purposes; in fact, half to three-fourth of the blood in the Hungarian horse is foreign. A commission of landowners and officers visits periodically every part of the country and selects the stallions best suited for the place. The thoroughly Hungarian city of Debreczin owns a stud in which they pride themselves to have preserved the original Hungarian horse in its primitive state unmixed with other blood. I have visited that stud * * and found that the horses are, without exception, bays or brown."

rians as even by our travellers of to-day, and it is probable that the names of the colours of their so-called wild horses were first confused by the language of the natives of the country in which such animals were found ; secondly, rather mixed up in the Greek ; thirdly, again confused in translation into English, either directly or through the Latin. It is certain, that more descriptions of colour are rather limited in value even when there are no obscurities of language. Darwin noticed that roan and iron-grey predominated among the wild horses of the Falkland Islands as descended from horses left by the French in 1764. Youatt says of the Tartary horse that he is "generally of a red colour with a black stripe along the back." Martin Duncan considers him mouse-coloured, and agrees as to the dorsal stripe, and he speaks of these horses as the "nearest example of the stock from which the domesticated horse was derived." Prejevalsky mentions the wild horse of Central Asia as bay, and elsewhere we hear him described as of a "rufous tinge." Any one who has had to describe properly a number of battery or transport mules, or even of country-bred horses, will clearly enter into the colour difficulty, and understand how naturalists for scientific exactness would need some such standard colour scales as those introduced by Broca for anthropological observers. He will also have observed how wide embracing and indefinite are the vernacular colours *kumait* and *lal* ! In India we have in the Kattywar horse, which comes from a locality, the geographical position of which secures to an extent purity of race, an example in favour of dun being the original colour, and among country-bred stock we find many *duns* and mouse-coloured horses. We observe a great tendency of prevalence of the donkey mark along the back, and even slightly a cross mark on the shoulders, also pale colour of limbs and markings on the knees and hocks, zebra-marks. The frequency of parti-colouration is simply the effect of natural crossing ; it is seen among all semi-wild stock and low-caste varieties of the horse. As regards colour of original horses, I think we can come no nearer a conclusion than that the groundwork varied somewhat in the different localities according to prevalent colour of soil, probably from very light dun through mouse-colour and chestnut to bay-brown, there being a well-marked donkey stripe and small cross bands, occasionally also faint stripes about the knees and hocks of a darker colour ; the limbs, lower part of the belly and muzzle generally somewhat lighter than the rest of the body. All the darker colours, all parti-coloura-

tion, and marks have probably resulted from domestication. A few of the original breed also probably were Albinoes.

With regard to *shape*, all the evidence tends to the belief that in all the points which render a horse useful to mankind, domestication has improved him, though he probably has been rendered less enduring and more liable to disease. The cave horse, whose portrait has been handed down to us carved on horn, had a large head, thick neck, big mane, and coarse and clumsy points (Duncan); but we have seen that the artist cannot be absolutely relied on for proportions.* If we be permitted to imagine, on the basis of what we know of the oldest wild horses and of the least cared-for breeds, we may describe the original horse as follows:—Head large, fine or coarse in the muzzle, badly put on, eyes far back, ears large, neck thick and coarse, shoulder small and upright, forearm muscular and short, tendons a little deficient below the knee, pasterns upright, feet blocky and good, back rather short, girth moderate, loins muscular, quarters round, tail set on low, hocks big and compact but very short, thighs very short but muscular.

Now, such a horse is not at all what we would try to buy for any domestic purpose, but it is the unspecialised form which in the zebra and wild ass we find compatible with fair speed, remarkable endurance, and other high qualities. I, as a horseman, criticising the works of Nature, must not be supposed to be indulging in ridiculous fault-finding with perfection. The wild horse is suited admirably to the wild free life for which he is intended, but he cannot compete either in speed with the race-horse (although his speed is not inconsiderable), in strength with the draught horse (though he can perform collar work moderately well with little training), nor is he, until brought under the controlling influence of man for several generations, and influenced in a particular direction by artificial selection, specially suited for any domestic purpose. The adaptability for work shown by the descendants of horses which have recently gone wild is wonderful. The little training the Australian and American horses receive to enable them to work proves that they have not yet outlived the inheritance of the useful quality of obedience to man. That a traveller should be able to cross South America by impressing wild horses successively to carry him is extraordinary.

In *size* there can be no doubt that (though an enormous fossil

* One of his ponies is not a bad shaped one, the other is like a Tapir.

horse is supposed to have lived in South America) the tendency of domestication has been towards increase. All the writers, with charming indefiniteness, speak of the wild horses as "small, strong, and not fast."

We have rather more accurate information as to their *powers of endurance*, which are undoubtedly considerable; it is not uncommon for an animal to be captured, ridden sixty or seventy miles straight off, and then the animal, tired, not "done up," to be enlarged; this work *on grass feed* is not bad. In some of the revolutions in South America these wild horses have been used extensively and in rather extraordinary ways. Thus Paez, the cavalry leader of Bolivar, broke in wild horses and so mounted a very considerable force, with which on one occasion he performed the extraordinary feat of capturing gunboats in midstream, the men swam their horses in and jumped on board from off the animals' backs. The aquatic powers of horses in this part of the world are remarkable, and it is peculiar that white horses are there thought most of, as being the best swimmers.

It is really wonderful how horses can *adapt themselves to emergencies*. Those of Central Asia, for example, have often to live like reindeer, eating snow for drink and gathering a scanty feed by scraping away the snow. Darwin tells us what a hard time of it horses sometimes have in South America. Cattle and horses in time of drought become so exhausted, that when they rush into rivers they are unable to crawl up the muddy banks, and thus are drowned. "All the small rivers become highly saline, and this caused the death of vast numbers in particular spots; for when an animal drinks of such water it does not recover. Azara describes the fury of the wild horses on a similar occasion, rushing to the marshes, those which arrived first being overwhelmed and crushed by those which followed. He adds that more than once he has seen the carcasses of upwards of a thousand wild horses thus destroyed." The distinguished naturalist comes to the conclusion that a geologist unacquainted with the occasional occurrence of this phenomenon would draw some conclusions of not altogether satisfactory stability from discovery of a breccia of horse bones.

Yet, in spite of adverse influences, rapidity of spread of horses is a phenomenon of which there can be no doubt. The *diffusion of horses* which in Mexico escaped into the woods and savannahs northward to the Rocky Mountains and to the sources of the Columbia, is, as Low points out, remarkable, yet not to be compared with what has

taken place in the plains of La Plata and other parts of the South American Continent. Darwin shows us that whereas the first horse was landed in America at Buenos Ayres in 1537, in 1580 (less than fifty years) the Patagonians had horses. This spread is, of course, not to be compared with the wonderful increase in numbers of horses in general in Australia which has recently been witnessed, but it may be remarked as an illustration of how wild horses spread, that in New South Wales, in 1875, 7,000 wild horses are recorded as having been shot without extermination, and the horse pest has attained such importance as, I believe, to have received legislative notice in some parts of Australia. Our members ought to be able to give us some interesting information in this matter. There is evidence that even in South America the numbers of horses have been materially lessened by the requirements of man recently.

Some curious *eccentricities of wild horses* deserve a passing notice. Darwin remarks on the extraordinary fact that without any apparent reason, and though there is no appreciable difference in climate and soil between the western and eastern parts of the Falkland Island on which he saw horses, they had never left the eastern part. Another peculiar point is noticed by Azara, the preference of wild horses for the dropping of excrement in or near roads. This carried out on a large scale, in South America, has an important influence on the procuration of fodder along the main tracks.

Darwin comments on the extreme difficulty of driving large bodies of horses over the South American plains. One remount officer who left Buenos Ayres with 500 had under 20 on arrival at his destination. The animals are excitable, and the approach of a puma or even a fox during the night will cause the horses to disperse in every direction, and even a storm will have the same effect ("*Voyage of the Beagle*"). This tendency to wild heedless bolting of large numbers of horses is a phenomenon not unknown to our cavalry officers and those of other nations. I know of one *stampede* of horses of a cavalry regiment mounted on Walers in this country, and two serious stampedes occurred among the Guards' horses and those of the Queen's Bays at Aldershot at the first autumn manœuvres. Paez in Bolivia turned this tendency to valuable account in the War of Independence, for he used to stampede bands of wild horses against the enemy at night. Finally, we may observe that, as the equine animals in South Africa have been noticed to have a curious tendency to "chum" with the Gnu and other ruminants, the wild horse also has been observed

on terms of settled friendship with the larger ruminants of the plains on which he is found.

The *paces of the horse* in a natural condition are the walk and gallop. As regards other paces, the amble and the canter are undoubtedly artificial, but it has been much discussed as to whether the wild horse trots. We need not enter into the arguments in detail here. The question has received much attention in America, and Hiram Woodruffe has concluded that the trot is a natural pace for young untrained animals; also zebras and other wild equines trot. There are evident fallacies in this argument, but to debate on the paces of the horse here would take too much time and trespass too much on the patience of the meeting.

Finally, in estimating *the influence on mankind of the wild horse in the present day*, we find a difficulty in separating him from the numerous herds of semi-wild animals which in most parts of the world are utilised as reserves of horse supplies, such as those of the great breeding establishments in Hungary,* Russia, and even in Chinese Tartary. A description of one of the latter by Prejevalsky may prove of interest: "The great Steppe country through which we passed from Doloknor is the pasture land of the Imperial horses. Every herd (*dargu* of the Mongols) numbers 500, and is under an officer; a superior officer is over all." They supply remounts in time of war. These horses are under the average

* Mr. Stockinger writes: "Hungary certainly has large breeding establishments which I have mostly seen more than once, but you will not find any animal even approaching the semi-wild state. The largest stud is called Mero Hegyes, which belongs to the Government, and covers an area of about 45,000 acres, numbering between 4 to 5,000 horses.

"They are divided according to breed, age, and sex into small herds numbering 80 to 100 at the utmost. Each herd is driven out to the pasture every morning by two to three well mounted men with long whips, and brought back in the evening into large separate enclosures, each of which contains a shed entirely open on one side.

"They are all perfectly tame, and one could hardly imagine a prettier sight than being surrounded by a flock of thoroughbred or half-bred yearlings searching your pockets for bread.

"The stallions are kept in stables all the year round, do the carriage and saddle-work of the superintending officers, and are about as peaceful and tame creatures as one would wish. I have never heard a scream or a kick in a stable containing perhaps 50 or more stallions.

"Large landed proprietors have studs kept very much on the same system; the stallions are either private property or belong to Government, who let them out for the season.

"The small landlord and peasant breeds horses as a domestic animal more like the Arab. They are about the house or farm; the boys jump on their backs as soon almost as they can stand on their legs; and he follows his master about like a dog. You will very often see a farmer drive about the country with the offspring and relations of his team after him. I know a good many books contain still accounts of the wild Hungarian horse, but these are things long, long gone by.

"The very natural and surest proof of this is that I have met very, very rarely with an ill-tempered or vicious horse, and then it can be almost invariably traced to bad treatment."

height, their legs and neck thick, head large, and coat long and shaggy, possess wonderful powers of endurance, remaining out in the open in extreme cold, and contenting themselves with the scanty herbage, or, if there be none, with such coarse stuff as camels feed on. In winter the snow serves them for water. They roam almost at liberty over the pasture lands of Northern Kalka and the country of the Chakhars. The larger herds are usually broken up into smaller troops of 10 to 30 mares, led by a stallion, who guards them with the greatest jealousy and never lets them out of his sight. The leaders of them have pitched battles with one another in the spring. Darwin observed a tribe of Indians which was gradually changing from hunters on foot to hunters on horseback, a neighbouring tribe lending them old and inferior horses to prevent their being absolutely starved through want of success in the chase.

The wild and semi-wild horses constitute together a grand reserve of remounts for the world's requirements. They are absolutely necessary for travelling in many parts; they even constitute a source of food supply to mankind; they give scope for reckless energy of certain classes of mankind which might otherwise find a less legitimate outlet; in some countries, as in primitive ages, skin, hair, hoofs, milk, and bones of horses are found useful. There is doubtless much waste in capture and breaking-in, yet the supplies seem almost inexhaustible, thanks to rapid propagation and wide range over suitable country. Even viewed as a feral animal there are few quadrupeds more useful to man than *Equus caballus*; as a domesticable being he is one of the grandest presents of Nature to mankind.

J. H. S.

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ON THE LEPIDOPTERA OF KARACHI AND ITS NEIGHBOURHOOD. (PART I.)

BY COL. C. SWINHOE, F.L.S., F.Z.S., &c.

THERE appears to be no record of any collection of Lepidoptera ever having been made in Karachi or in Southern Sind, beyond a short paper of my own which appeared in the Proceedings of the Zoological Society of London for 1884, p. 503.

I collected at and about Karachi, from December 1878 up to August 1880, employing (as I always do) the services of a trained

native collector, and recorded his captures daily in my journal. There was no sweet water in Karachi then, and but very few and feeble attempts at gardening—little but sand every where, and consequently the Lepidopterous fauna was very limited, and mainly limited, as might be expected, to desert forms.

With the introduction of the Mulleer Water Works the whole face of Karachi is rapidly changing—gardens are springing up everywhere, all kinds of new trees are being cultivated, and this change is bringing a number of fresh species of butterflies and moths into the neighbourhood. I received a number of new things from Mr. Murray in 1882, after an unusually heavy rainfall and during my stay there from the 30th March 1885 to 21st September 1886, I captured many more fresh species, and I now purpose giving a complete list of all the lepidoptera within my knowledge taken at Karachi and its vicinity up to date.

The list of species is still very limited ; it will no doubt go on increasing every year with the growth of vegetation, until it somewhat resembles that of Bombay, but in consequence of the sandy nature of its surroundings, Karachi will always contain many desert species, and will lack many of the species which thrive in the moist atmosphere of the Bombay coast. For instance, the genus *Ixias*, so plentifully represented in Bombay, is entirely absent from Karachi, as also the *eucharis* group of the genus *Callosune*, very abundant in Bombay, is nowhere to be seen about Karachi, whereas, on the other hand, the *dulcis* group of the same genus, and the *dynamene* group of the sub-genus *Idmais* to be met with in abundance in one or other of its species all the year through at Karachi, are only represented in Bombay by very rare specimens of *Callosune taplini*, Swinhoe, and *Idmais cypræa*, Fabr.

PART I.

RHOPALOCERA.

NYMPHALIDÆ.

EUPLOEINÆ.

1. *Tirumala limniace*.

Papilio limniace, Cramer, Pap. Exot. i., pl. 59 f. D. E (1779).

July 1882, in great plenty after heavy rain, and is now quite a common insect during the months of July and August, since the introduction of the Mulleer water into Karachi and the consequent increase of vegetation.

2. *Salatura genutia*.

Papilio genutia, Cramer, Pap. Exot. iii., pl. 206, f. C. D. (1782).

Is also now becoming a common insect at Karachi during the months of June and July and August.

3. *Limnas chrysippus*.

Papilio chrysippus, Linn., Mus. Ulr., p. 263 (1764).

Common everywhere in Sind all the year round.

4. *Limnas dorippus*.

Euploea dorippus, Klug., Symb. Phys., pl. 48, f. 1-5 (1845).

Never common; an odd specimen taken occasionally all the year round.

5. *Limnas alcippoides*.

Limnas alcippoides, Moore, P.Z.S., 1883, p. 238, pl. 31, f. 1.

Same note as above.

SATYRINÆ.

6. *Melanitis leda*.

Papilio leda, Linn., Syst. Nat. i., 2, p. 773 (1767).

A rare insect at Karachi. I took one in 1879 and one in July 1886.

7. *Melanitis ismene*.

Papilio ismene, Cramer, Pap. Exot. i., pl. 26, f. A. B. (1775)

Rare; one taken by me in May 1886.

8. *Ypthirna asterope*.

Hipparachia asterope, Klug., Symb. Phys., pl. 29, f. 11-14, (1832).

I took one in May 1886; it is identical with specimens in my collection from Arabia identified by Mr. A. G. Butler of the British Museum.

NYMPHALINÆ.

9. *Atella phalanta*.

Papilio phalanta, Drury, Ill. Exot. Ent. i., pl. 21, f. 1, 2 (1773).

This is also a rare insect in these parts. I got one at Karachi in July 1882, and received one in a small collection made by Sir Oliver St. John in Kozdar, Beloochistan.

10. *Pyrameis cardui*.

Papilio cardui, Linn., Faun. Suec., p. 276 (1761).

Common throughout the year.

11. *Junonia lemonias*.*Papilio lemonias*, Linn., Mus. Ulr., p. 277 (1764).

Taken in November 1885.

12. *Junonia hierta*.*Papilio hierta*, Fahr., Ent. Syst. Suppl., p. 424 (1798).

Not observed in 1879 or 1880; is, however, becoming common. It was plentiful in several months of the year in 1885 and 1886.

13. *Junonia orithya*.*Papilio orithya*, Linn., Mus. Ulr., p. 278 (1764).

A few taken in April and May 1879 and 1880, but is becoming quite common, and was taken in great plenty in June, July, and August 1885 and 1886.

14. *Junonia asterie*.*Papilio asterie*, Linn., Syst. Nat. i. 2, p. 769 (1767).

One taken in November 1880.

15. *Junonia almana*.*Papilio almana*, Linn., Mus. Ulr., p. 272 (1764).

The commonest species of the genus appears in January, April and November.

16. *Hypolimnas bolina*.*Papilio bolina*, Linn., Mus. Ulr., p. 295 (1764).

Two specimens in July 1882, one in July 1886, and one in the following month.

17. *Hypolimnas misippus*.*Papilio misippus*, Linn., Mus. Ulr., p. 264 (1764).

Common from June to December. The female mimics *Limnas dorippus* more commonly than *L. chrysippus*.

LYCÆNIDÆ.

18. *Polymmatius boeticus*.*Papilio boeticus*, Linn., Syst. Nat. i. 2, p. 789 (1767).

Common in every month of the year.

19. *Lampides strabo*.

Hesperia strabo, Fahr., Ent. Syst. iii., p. 287 (1793); *Lycæna kandarpa*, Horsfield, Cat. Lep. E. I. C., p. 82. (1829); *Lampides asoka*, Kollar, Hüg. Kasch. iv., p. 419, ♂ 6; *Lampides didda*, Kollar, Hüg. Kasch. iv., p. 420, ♂.

Common in July and August.

20. *Catochrysops cnejus*.*Hesperia cnejus*, Fahr., Ent. Syst. Suppl., p. 430 (1798).

Common during August, September and October.

21. *Catochrysops contracta*.

Lampides contracta, Mr. Butler, P. Z. S., 1880, p. 406, pl. 34, f. 3.

Common from May to September. Butler's type came from Kandahar; the Karachi examples are identical with the Kandahar form.

22. *Catochrysops ella*.

Catochrysops ella, Butler, P. Z. S., 1881, p. 606.

Common in December and January.

23. *Tarucus nara*.

Lycaena nara, Kollar, Hüg. Kasch. vi. 2, p. 421 (1848).

Common from April to August. A species allied to *T. nara* with attenuated markings on the wings below occur at Karachi in June; it appears to me to be distinct and has yet to be described. I have examples taken in June 1879, in June 1885, and in the Hubb River, taken by Captain Becher, R. A., in September 1885.

24. *Tarucus extricatus*.

Tarucus extricatus, Butler, P. Z. S., 1886, p. 367, pl. 35, f. 2.

Taken in May, October and December 1885, and in January and April 1886.

25. *Tarucus plinius*.

Hesperia plinius, Fab., Ent. Syst. iii., 1, p. 284 (1793).

Common in May, June and July.

26. *Zizera trochilus*.

Lycaena trochilus, Freyer, Neuere. Beitr. v., pl. 440, f. 1 (1844).

June 1885, and taken by Captain Becher on the Hubb River in September 1885.

27. *Zizera karsandra*.

Polyommatus karsandra, Moore, P. Z. S., 1865, p. 505, pl. 31, f. 7.

The commonest *Lycaena* in Karachi. It occurs in great plenty in April and May, and again in countless numbers in November and December.

28. *Zizera mora*.

Zizera mora, Swinhoe, P. Z. S., 1884, p. 506, pl. 47, f. 2.

June 1879 and June 1882.

29. *Zizera pygmæa*.

Lycæna pygmæa, Snellen, Tijdschr., Ent. xix., pl. 7, f. 3 (1876).

July 1882.

30. *Chilades putli*.

Lycæna putli, Kollar, Hüg. Kasch., p. 424 (1848).

Muggur Pir. August, 1880.

31. *Azanus zena*.

Lycæna zena, Moore, P. Z. S., 1865, p. 505, pl. 31, f. 9.

Common from July to November.

32. *Azanus uranus*.

Azanus uranus, Butler, P. Z. S., 1886, p. 366, pl. 35, f. 1.

Three taken in August 1886, and one taken by Captain Becher in the Hubb River in September 1885.

33. *Spindasis trifurcata*.

Aphnæus trifurcata, Moore, P. Z. S., 1882, p. 251.

Several taken in the Hubb River by Captain Becher in September 1885.

34. *Spindasis acamas*.

Lycæna acamas, Klüg., Syst. Phys., pl. 40, f. 7-9 (1834).

Common in January and February 1880 and July 1881. One taken in July 1885.

PAPILIONIDÆ.

PIERINÆ.

35. *Terias læta*.

Terias læta Boisduval, Sp. Gen. i., p. 674 (1836).

One taken in June 1879 is a common insect at Karachi, and is very plentiful in May and June.

36. *Terias hecabe*.

Papilio hecabe, Linn., Mus. Ind. Ulr., p. 249 (1764).

Common from April to August.

37. *Terias hecabeoides*.

Terias hecabeoides, Men., Cat. Mus. Petr. Lep. i., p. 85, pl. 2, f. 2 (1855).

Is also common during the summer months. It is doubtfully distinct from the preceding, its only difference being a heavier marginal border, and in the forewing this border extends further in on the hinder margin.

38. *Terias æsiopæ*.

Terias æsiopæ, Men., Cat. Mus. Petr. Lep. i., p. 85, pl. 2, f. 3 (1885).

July and August. This insect is also doubtfully distinct, the two former are free of all red markings on the wings below. *T. æsiopæ* has a red apical patch, below the wings above with its deep border being almost identical with *T. hecabeoides*.

39. *Terias curiosa*.

Terias curiosa, Swinhoe, P. Z. S., 1884, p. 508, pl. 47, f. 3. August, 1879.

40. *Terias excavata*.

Terias excavata, Moore, P. Z. S., 1882, p. 252. August to January.

41. *Terias purreea*.

Terias purreea, Moore, P. Z. S., 1882, p. 252. November to January.

42. *Terias asphodelus*.

Terias asphodelus, Butler, P. Z. S., 1883, p. 151, pl. 24, f. 13. November to March.

43. *Terias irregularis*.

Terias irregularis, Moore, P. Z. S., 1882, p. 253, pl. 12, f. 3. January, 1886.

The last four species all have red patches on the wings below; some Lepidopterists think they are all varieties of one species. This may be the case, or else they may be seasonal forms, but they are not difficult to separate, and a long series of them will show very few intermediates.

44. *Terias venata*.

Terias venata, Moore, Cat. Lep. E. I. C. i., p. 65, pl. 2 a, f. 2 (1857).

Observed for the first time at Karachi in July 1886, when I took four; it will probably become as common in a year or two with the increase of vegetation as it is in Bombay.

45. *Idmais fausta*.

Papilio fausta, Oliver, Voy. l'Europ. Atl., pl. 33, f. 4 a. b. (1801).

Never common at Karachi, but an odd one taken occasionally from May to August. The males of this species have a sexual mark on the forewings in the form of a small embossed patch.

46. *Idmais protractus*.

Teracolus protractus, Butler, P. Z. S., 1876, p. 137.

A rare insect here, one taken in Karachi in January and one in March 1879; it is common on the Hubb River from July to November, and in great plenty on the banks of the Indus at Hyderabad.

47. *Idmais vestalis*.

Teracolus vestalis, Butler, P. Z. S., 1876, p. 135, pl. 7, f. 10, and 1881, p. 609.

In great plenty from April to June.

48. *Idmais puellaris*.

Teracolus puellaris, Butler, P. Z. S., 1876, p. 136, and 1881, p. 609.

Scarce at Karachi. Common in the interior; an occasional specimen to be taken from May to August.

49. *Idmais ochreipennis*.

Teracolus ochreipennis, Butler, P. Z. S., 1876, p. 136, pl. 1881, p. 609.

Plentiful in December.

50. *Idmais peelus*

Teracolus peelus, Swinhoe, P. Z. S., 1884, p. 439, pl. 39, f. 9.

Taken in May and September.

51. *Idmais dubia*

Teracolus dubius, Swinhoe, P. Z. S., 1884, p. 439.

July, August and September.

A key to the last six species may be useful.

Above they are all more or less similar, except that *I. puellaris* and *I. dubia* have the marginal black bands on the hind wings deeper than in the other species; their distinctive differences are in the colouration and markings of the wings below, as under.

I. vestalis, Butler, and *I. puellaris*, males, both wings below sulphur yellow, forewings with three black spots near outer margin, below the median branches; in *I. vestalis* the centre spot the largest, in *I. puellaris* with the lowest spot extending downwards and expanding upon the hinder margin; females very similar in appearance, but the band on the hind wings above in *I. puellaris* is as in the males deeper than in *I. vestalis*; below the markings are very much as in the male, but the hind wings are flesh colour, the colour being darker in *I. puellaris* than in *I. vestalis*.

I. ochreipennis, Butler, below both sexes with the three spots in the fore wings as in *I. vestalis*; hind wings in both sexes flesh colour.

I. peplus Swinhoe, is like a yellow *I. vestalis*.

I. dubia, Swinhoe, is like a very large *I. vestalis*, with all the black markings much deeper above and below, with a discal series of large reddish brown spots in the hind wings below.

I. protractus is marked like *I. puellaris* above and below, but is of a deep salmon colour above. There are several other differences between the various species, but by these alone they can be easily separated, and these characteristics appear to be quite constant.

52. *Idmais dynamene*

Pontia dynamene, Klug., Symb. Phys. pl. 6, f. 15, 16 (1829);

Teracolus carinifer, Butler, P. Z. S., 1876, p. 138, pl. 7, 8, 89.

Very common all the year round.

53. *Idmais calais*

Papilio calais, Cramer, Pap. Exot. i., pl. 53, f. C. D. (1779).

One taken by Captain Becher at Karachi in June 1885, and is identical with my Aden specimens identified by Mr. Butler.

54. *Callosune dulcis*.

Teracolus dulcis, Butler, P. Z. S., 1876, p. 157, pl. 7, f. 13,

Teracolus dirus, Butler, l. c. f. 11; *Teracolus eboreoides*,

Butler, l. c. p. 158, pl. 7, f. 12; *Teracolus immaculatus*,

Swinh., P. Z. S., 1884, p. 443.

Common from April to August.

Typical specimens of all the above can easily be separated, but there are so many intermediates, it is impossible to separate them as distinct species. *C. dulcis* is the common form, the hind wings below have a complete whorl of small discal brownish spots, and *C. immaculatus*, *C. eboreoides*, and *C. dirus* are larger butterflies. Below on the fore wings are two black patches on the outer margin near the hinder angle. In *C. eboreoides* the discal spots on the hind wings are double, prominent, complete, and very black; in *C. dirus* these large spots are only represented by two or three pairs from the costa downwards, and in *C. immaculatus* they are entirely absent, there being many only one pair of spots on the costa.

55. *Collosune subroseus*

Teracolus subroseus, Swinhoe, P. Z. S., 1884, p. 443, pl. 40, f. 67.

July to November.

A good and distinct species, but of this as of *C. dulcis* there appear to be some varieties more or less constant. One form has the hind wings below pure white, and in another form the hind wings are shaded with pale purple. I have a long series of all these forms in my collection with many intermediates. *C. subroscus* in its typical rose-coloured form is a very common insect at Ahmedabad.

56. *Callosune etrida*.

Anthocaris etrida, Boird., Sp. Gen. Lep. i., p. 576 (1836).

Teracolus purus, Butler, P. Z. S., 1876, p. 160, pl. 7, f. 14, 15.

Common from April to July.

57. *Callosune pernotatus*

Teracolus pernotatus, Butler, P. Z. S., 1876, p. 159, pl. 7, f. 1.

July, August and September.

58. *Callosune farrinus*

Teracolus farrinus, Butler, P. Z. S., 1876, p. 159, pl. 7, f. 2.

May to September.

59. *Callosune limbatus*

Teracolus limbatus, Butler, P. Z. S., 1876, p. 161.

June 1880 to October 1885.

C. etrida has the underside of the hind wings immaculate, *C. limbatus* (common in Ceylon) is similar, but has the black band on hind wings above entire and not macular.

C. pernotatus has a whorl of pale blackish rather diffused discal spots on the hind wings below, and so has *C. farrinus*, but the latter is a larger insect, and has all its black markings deeper; the inner black band of the orange apical patch on the fore wings above is broad, and the black macular marginal band of the hind wings above consists of large spots, sometimes like black patches.

I am inclined to think there are only two, not four species, but the types of each are very distinct in appearance, and until proof can be produced they must stand.

60. *Callosune bimbura*

Teracolus bimbura, Butler, P. Z. S., 1876, p. 161, pl. 7, f. 3, 4.

December, January and February.

The type came from Bimbur in Cashmir, but it is common during the cold weather in the plains all over Western and Southern India; above it is like a finely marked *C. etrida*; below the hind wings (excepting the discoidal cell) are pinkish suffused with brown atoms, the discoidal cell standing out pale whitish in the pinkish brown coloration.

61. *Belenois mesentina*—

Papilio mesentina, Cramer, Pap. Exot. iii., pl. 27, f. A.B. (1782).

Pieris lordaca, Walker, Entom. v., p. 48 (1870).

Belenois auriginea, Butler, P.Z.S., 1886, p. 374.

Common from February to June.

The females are mostly of the *B. lordaca* form. Mr. Butler has lately split the Indian form of this species into three species, but I cannot follow him, with a very long series from all parts of India, including many from the Punjab, from whence his types of *B. lordaca* and *B. auriginea* came. I cannot separate the three forms though I can pick out typical specimens of all these. The only conclusion to arrive at appears to me to be that *B. mesentina* is a very variable species.

62. *Catopsilia pyranthe*.

Papilio pyranthe, Linn., Mus. Ulr., p. 245 (1764).

May to August common.

63. *Catopsilia ilea*.

Papilio ilea, Fab., Ent. Syst. Suppl., p. 426 (1798).

May and June.

64. *Catopsilia philippinia*—

Papilio philippinia, Cram., Pap. Exot. iv., pl. 361, f. C.D. (1782).

Common from September to January.

65. *Catopsilia crocale*

Papilio crocale, Cram., Pap. Exot. i., pl. 55, f. C. D. (1779).

One taken in 1879, another in July 1882. It is now more common during the months of June and July.

PAPILIONINÆ.

66. *Menelaides aristolochiæ*.

Papilio aristolochiæ, Fab., Ent. Syst., p. 443 (1775).

Papilio diphilus, Esper., Ausl. Schmitt, pl. 40, B. f. 1. (1785-98).

Very common in July and August.

67. *Ophiedes erithonius*

Papilio erithonius, Cram., Pap. Exot. iii., pl. 232, f. A. B. (1782).

Common all the year round.

HESPERIDÆ.

68. *Parata alexis**Papilio alexis*, Fab., Syst. Ent. p. 533 (1775).

One example, July 1882.

69. *Badamia exclamationis**Papilio exclamationis*, Fab., Syst. Ent., p. 530 (1775).

One example, June 1885.

70. *Chapra midea**Pelopidas midea*, Walker, Entom. v., p. 56 (1870).

Common at all seasons. This is the large pale form of *Chapra mathias*, Fabr. I have received it also from Khozdar in Beloochistan from Sir O. St. John. Walker's type came from Turkey.

71. *Parnara bevani**Hesperia bevani*, Moore, P. Z. S., 1878, p. 688.

July 1887 and October 1885.

72. *Gegenes karsana**Hesperia karsana*, Moore, P. Z. S., 1874, p. 576, pl. 67, f. 6.

April to October.

73. *Pyrgus galba**Hesperia galba*, Fab., Ent. Syst. iii. 1, p. 352 (1793).*Pyrgus superna*, Moore, P. Z. S., 1865, p. 792.

June to September.

74. *Pyrgus evanidus**Pyrgus evanidus*, Butler, Ann. and Mag. Nat. Hist., March, 1880, p. 223.

January, February and March.

75. *Gomalia litoralis**Gomalia litoralis*, Swinhoe, P. Z. S., 1884, p. 513, pl. 47, f. 4.

July 1879.

LIST OF BIRDS' EGGS IN THE SOCIETY'S COLLECTION.

Jerdon's No.	Scientific Name.	Popular Name.	No. of Eggs.
2	<i>Otogyps calvus</i> , Scop.....	The King Vulture	1
4 bis.	<i>Gyps pallescens</i> , Hume	The Long-billed Pale Brown Vulture.	1
5	<i>Pseudogyps bengalensis</i> , Gm. ...	The White-backed Vulture ...	4
6	<i>Neophron ginginianus</i> , Lath.....	The Scavenger Vulture	1
11	<i>Falco jaggur</i> , J. E. Gr.	The Jaggur Falcon	1
23	<i>Astur badius</i> , Gm.	The Shikra	2
29	<i>Aquila vindhiana</i> , Frankl.....	The Tawny Eagle	2

Jerdon's No.	Scientific Name.	Popular Name.	No. of Eggs.
33	<i>Nisaetus fasciatus</i> , Vieill.	The Crestless Hawk Eagle ...	1
35	<i>Limnaetus cirrhatus</i> , Gm.	The Crested Hawk Eagle	1
42	<i>Haliaetus leucoryphus</i> , Pall.	The Ring-tailed Fishing Eagle.	2
48	<i>Butastur teesa</i> , Frankl.	The White-eyed Buzzard	2
56	<i>Milvus govinda</i> , Sykes	The Pariah Kite	16
69	<i>Bubo bengalensis</i> , Frankl.	The Rock Horned Owl	5
70	<i>Bubo coromandus</i> , Lath.	The Dusky Horned Owl	1
76	<i>Carine brama</i> , Tem.	The Spotted Owlet	5
84	<i>Hirundo filifera</i> , Steph.	The Wire-tailed Swallow	1
85	<i>Hirundo erythropygia</i> , Sykes ...	The Red-rumped Swallow	1
86	<i>Hirundo fluviicola</i> , Jerd.	The Indian Cliff Swallow	2
90	<i>Ptyonoprogne concolor</i> , Sykes ...	The Dusky Crag Martin.	1
100	<i>Cypsellus affinis</i> , J. E. Gr.	The Common Indian Swift ...	5
103	<i>Colocalia unicolor</i> , Jerd.	The Edible Nest Swiftlet	2
112	<i>Caprimulgus asiatica</i> , Lath.	The Common Indian Nightjar.	4
114	<i>Caprimulgus monticulus</i> , Frankl.	Franklin's Nightjar	2
117	<i>Merops viridis</i> , Lin.	The Common Indian Bee-eater.	3
118	<i>Merops philippinus</i> , Lin.	The Blue-tailed Bee-eater	1
121	<i>Merops apiaster</i> , Lin.	The European Bee-eater	1
123	<i>Coracias indica</i> , Lin.	The Indian Roller	4
125	<i>Coracias garrula</i> , Lin.	The European Roller	1
129	<i>Halcyon smyrnensis</i> , Lin.	The White-breasted Kingfisher.	1
134	<i>Alcedo bengalensis</i> , Gm.	The Indian Kingfisher	3
144	<i>Ocyrceros birostris</i> , Scop.	The Common Grey Hornbill ...	2
148	<i>Palæornis torquatus</i> , Bodd.	The Rose-ringed Paroquet.	3
149	<i>Palæornis purpureus</i> , P. L. S. M.	The Rose-headed Paroquet ...	1
160	<i>Picus mahrattensis</i> , Lath.	The Yellow-fronted Woodpecker.	1
164	<i>Yungipicus nanus</i> , Vig.	The Southern Pigmy Woodpecker.	1
193 bis.	<i>Megalæma inornata</i> , Wald.	The Western Green Barbet ...	1
212	<i>Coccyzus jacobinus</i> , Bodd.	The Pied Crested Cuckoo	2
214	<i>Endynamis honorata</i> , Lin.	The Indian Koel	4
217	<i>Centrococcyx rufipennis</i> , Ill.	The Indian Coucal	4
234	<i>Cynnyris asiatica</i> , Lath.	The Purple Honey-sucker	5
256	<i>Lanius lahtora</i> , Sykes.	The Indian Grey Shrike.	2
257	<i>Lanius erythronotus</i> , Vig.	The Rufous-backed Shrike.	6
260	<i>Lanius vittatus</i> , Valenci.	The Bay-backed Shrike.	5
265	<i>Tephrodornis pondiceriana</i> , Gm..	The Common Wood Shrike ...	3
268	<i>Volvocivora Sykesi</i> , Strickl.	The Black-headed Cuckoo Shrike.	1
276	<i>Pericrocotus peregrinus</i> , Lin. ...	The Small Minivet	3
277	<i>Pericrocotus erythropygius</i> , Jerd.	The White-bellied Minivet ...	2
278	<i>Buchanga atra</i> , Herm.	The King-Crow	5
288	<i>Muscipeta paradisi</i> , Lin.	The Paradise Fly-Catcher	1
292	<i>Leucocerca aureola</i> , Vieil.	The White-browed Fantail ...	4
343	<i>Myiophonus temminckii</i> , Vig. ...	The Idle Schoolboy.	2
354	<i>Geocichla cyanotis</i> , Jerd.	The White-winged Ground Thrush.	2
385	<i>Pyctoris sinensis</i> , Gm.	The Yellow-eyed Babbler	4
389	<i>Alcippe poiocephala</i> , Jerd.	The Quaker Thrush	2
397	<i>Dumetia hyperythra</i> , Frankl. ...	The Rufous-bellied Babbler ...	2
432	<i>Malacocercus terricolor</i> , Hodgs. .	The Bengal Babbler	1
435	<i>Malacocercus somervillei</i> , Sykes	The Rufous-tailed Babbler.	2
436	<i>Argya malcolmi</i> , Sykes.	The Large Grey Babbler	10
438	<i>Chatarrhoea caudata</i> , Dum.	The Striated Bush Babbler ...	20
452	<i>Ixus luteola</i> , Less.	The White-browed Bush Bulbul.	1
460 bis.	<i>Otocompsa fuscicaudata</i> , Gould..	The Southern Red-whiskered Bulbul.	2
462	<i>Molpastes haemorrhous</i> , Gm. ...	The Common Madras Bulbul ...	18
468	<i>Iora tiphia</i> , Lin.	The White-winged Iora	2
470	<i>Oriolus kundoo</i> , Sykes	The Indian Oriole	3
475	<i>Copsychus saularis</i> , Lin.	The Magpie Robin	2

Jerdon's No.	Scientific Name.	Popular Name.	No. of Eggs.
479	<i>Thamnobia fulicata</i> , Lin.	The Indian Black Robin	3
480	<i>Thamnobia cambaiensis</i> , Lath....	The Brown-backed Indian Robin.	4
505	<i>Rhyacornis fuliginosa</i> , Vig.	The Plumbeous Water Robin...	1
530	<i>Orthotomus sutorius</i> , Forst. ...	The Indian Tailor Bird	5
535	<i>Prinia stewarti</i> , Bly.	Stewart's Wren Warbler	3
538	<i>Prinia gracilis</i> , Frankl.	The Malabar Wren Warbler ...	23
539	<i>Cisticola cursitans</i> , Frankl.	The Rufous Grass Warbler ...	2
543	<i>Drymœca inornata</i> , Sykes	The Common Wren Warbler..	20
545	<i>Drymœca sylvatica</i> , Jerd.	The Jungle Wren Warbler ...	4
546	<i>Drymœca neglecta</i> , Jerd.	The Allied Wren Warbler.....	1
551	<i>Franklinia buchanani</i> , Bly.	The Rufous-fronted Wren Warbler.	3
582	<i>Sylvia affinis</i> , Bly. ...	The Lesser White Throat	1
589	<i>Motacilla madraspatensis</i> , Gm ...	The Pied Wagtail	2
631	<i>Zosterops palpebrosa</i> , Tem.	The White-eyed Tit.....	1
660	<i>Corvus macrorhynchus</i> , Wagl. ...	The Bow-billed Corby	8
663	<i>Corvus splendens</i> , Vieill.	The Common Indian Crow ...	2
674	<i>Dendrocitta rufa</i> , Scop.....	The Common Indian Magpie...	2
682	<i>Sturnus nitens</i> , Hume	Hume's Starling	1
684	<i>Acridotheres tristis</i> , Lin.	The Common Myna	3
685	<i>Acridotheres ginginianus</i> , Lath. .	The Bank Myna	4
687	<i>Sturnia pagodarum</i> , Gm.	The Black-headed Myna	4
694	<i>Ploceus philippinus</i> , Lin.	The Common Weaver Bird.....	13
699	<i>Amadina punctulata</i> , Lin.....	The Spotted Munia	1
703	<i>Amadina malabarica</i> , Lin.	The Plain Brown Munia	14
706	<i>Passer domesticus</i> , Lin.	The House Sparrow	13
756	<i>Mirafra erythroptera</i> , Jerd.	The Red-winged Bush Lark ...	2
760	<i>Pyrrhuloxia grisea</i> , Scop.....	The Black-bellied Finch Lark..	3
765	<i>Spizalauda deva</i> , Sykes	The Small Crown Crest Lark...	1
788	<i>Columba intermedia</i> , Strickl. ...	The Blue Rock Pigeon	2
794	<i>Turtur senegalensis</i> , Lin.	The Little Brown Dove	6
795	<i>Turtur suratensis</i> , Gm.	The Spotted Dove	2
796	<i>Turtur risorius</i> , Lin.	The Common Ring Dove	5
802	<i>Pterocles exustus</i> , Tem.....	The Common Sand Grouse ...	4
803	<i>Pavo cristatus</i> , Lin.	The Pea-Fowl	2
803 oct.	<i>Megapodius nicobaricus</i> , Bly. ...	The Nicobar Mound Bird	1
814	<i>Galloperdix spadiceus</i> , Gm.	The Red Spur-Fowl	1
819	<i>Francolinus pictus</i> , Jerd.	The Painted Partridge	1
822	<i>Ortygornis pondicerianus</i> , Gm....	The Grey Partridge	2
826	<i>Perdula asiatica</i> , Lath.	The Rock Bush Quail.....	2
830	<i>Coturnix coromandelica</i> , Gm. ...	The Black-breasted Rain Quail.	5
832	<i>Turnix taigoor</i> , Sykes	The Black-breasted Bustard Quail.	6
839	<i>Syphæotides aurita</i> , Lath.	The Likh	1
843	<i>Glareola lactea</i> , Tem	The Small Swallow Plover ...	2
855	<i>Lobivanellus indicus</i> , Bodd.	The Red-wattled Lapwing.....	13
856	<i>Lobipluvya malabarica</i> , Bodd. ...	The Yellow-wattled Lapwing..	3
858	<i>Æsacus recurvirostris</i> , Cuv.	The Large Stone Plover.....	1
859	<i>Ædienemns scolopax</i> , S. G. Gm. .	The Stone Plover	2
863	<i>Grus antigone</i> , Lin.....	The Sarns.....	4
900	<i>Parra indica</i> , Lath.....	The Bronze-winged Jacana ...	6
901	<i>Hydrophasianus chirurgus</i> , Scob.	The Pheasant-tailed Jacana ...	5
902	<i>Porphyrio poliocephalus</i> , Lath....	The Purple Coot	1
903	<i>Fulica atra</i> , Lin.	The Coot	1
905	<i>Gallinula chloropus</i> , Lin.	The Moor-Hen	3
907	<i>Erythra phœnicura</i> , Penn.	The White-bellied Water Hen .	5
909	<i>Porzana marsetta</i> , Leach.....	The Spotted Crane Hen	1
913	<i>Hypotimides striata</i> , Lin.	The Blue-breasted Rail	1
920	<i>Dissura episcopa</i> , Bodd.....	The White-necked Stork	1
925	<i>Herodias torra</i> , B. Ham.	The Large Egret.....	3
926	<i>Herodias intermedia</i> , Huss.	The Smaller Egret	3
927	<i>Herodias gazetta</i> , Lin.	The Little Egret	1
929	<i>Bubulens coromandus</i> , Bodd.....	The Cattle Egret.....	6
930	<i>Ardeola grayi</i> , Sykes	The Pond Heron	3

Jerdon's No.	Scientific Name.	Popular Name.	No. of Eggs.
933	<i>Ardetta cinnamomea</i> , Gm.	The Chesnut Bittern	4
937	<i>Nycticorax grisea</i> , Lin.	The Night Heron	3
938	<i>Tantalus leucocephalus</i> , Forst ...	The Pelican Ibis	1
939	<i>Platalea leucorodea</i> , Lin.	The Spoonbill Heron ..	7
940	<i>Anastomus oscitans</i> , Bodd.	The Shell Ibis	6
941	<i>Ibis melanocephala</i> , Lath.	The White Ibis	7
944	<i>Phoenicopterus antiquorum</i> , Tem.	The Flamingo	1
950	<i>Sarcidiornis melanonotus</i> , Penn.	The Comb Duck	1
969	<i>Fuligula nyroca</i> , Guld.	The White-eyed Pochard	2
975	<i>Podiceps minor</i> , Gm.	The Dabchick	7
984	<i>Hydrochelidon hybrida</i> , Pall. ...	The Marsh Tern	2
985	<i>Sterna seena</i> , Sykes	The Large River Tern	6
988 <i>ter.</i>	<i>Sterna saundersi</i> , Hume.	Saunders's Little Tern	3
1004	<i>Pelecaus philippensis</i> , Gm.	The Grey Pelican	4
1008	<i>Phalacrocorax fuscicollis</i> , Step. .	The Lesser Cormorant	2
1008	<i>Plotus melanogaster</i> , Penn.	The Snake Bird	5

ZOOLOGICAL NOTES.

NOTES ON A HORN ON THE MARGIN OF A GOAT'S EAR.

By Veterinary Surgeon J. H. STEEL, Superintendent, Bombay Veterinary College.

THIS specimen, presented by Colonel Biddulph, was obtained in Deoli (Rajpntana). The head is a fine one of black colour and having two spiral horns well developed. of even twist and backward and outward slope; the ears are long, broad, and pendant, covered externally with short black hair and internally having a fair quantity of long straight hair near the margins. The peculiarity affects the posterior margin and both the surfaces of the right ear at about the middle third of the margin, a distance of some three inches from the tip. On the outer surface a semicircle of the skin about half an inch in diameter has undergone warty change, forming an irregular horny mass, the area of which is extended by the circular base of the horn which grows from the inner surface. The base of the horn is about $1\frac{1}{2}$ in. in diameter, it has hairs growing from among the horny material and a small irregular projection like the commencement of another horn on a smaller scale. The horn is in the main conical, about 5 in. in length, and curls slightly outwards at its tip, its growth is by concentric rings and its texture is distinctly fibrous, but less regular than that of ordinary horns. Its attachment to the ear seems firm enough, but only by a very small portion of its base, and looks so imperfect that the Honorary Secretary in handing me the specimen implored me, whatever I did, not to let the horn come off the ear. The base is not quite circular, being prolonged somewhat supero-internally. The growth seems a genuine natural though irregular one, and we are informed in the letter which accompanied the head that there was

another irregular horn on one of the limbs ; thus the animal seems to have had a tendency to such growths (*Keratogenous diathesis*). There are many such cases on record both in man and in the lower animals, but irregularities of this nature are always worthy of careful examination and record, for irregular horns may be of several different kinds :—

I.—Commemorative or Atavisms.—Recurrences to original type, as when individuals of hornless breeds of cattle develop horns ; true frontal horns as occasionally seen in horses may serve to illustrate affinities or possibilities of future development.

II.—Degenerated Organs.—Horns about the limbs are generally of this nature, and somewhat resemble the “warts” of the fore and hind limbs of the horse, the rudimentary claws of cattle. It would have been of interest to know whether the horn on the limb of this goat was a degenerated limb or not.

III.—Accidental displacements of normal horns.

IV.—Simple warty growths.—Thickenings of the epithelium assuming a horny character, and physically compelled to become conical in forms known to cutaneous surgeons as cornua.

V.—Compensatory.—Developed as atonement for loss of these natural means of offence and defence ; as in the case of which I show a drawing made by me from the original in the Museum of the Royal Veterinary College of London. The horn of a cow was broken, and from the side of the stump shot out at right angles a true young hollow horn, a phenomenon of sprouting which is most remarkable in an animal so high in the scale as the ox.

VI.—Physiological.—Such as the natal collosities of the monkeys (seen also in old and ill-tended dogs) and the horny pads of the knees, stifles, elbows, and brisket of the camel.

In the case in question the horn is neither commemorative nor a degenerated organ, for it is not natural to any animals allied to the goat to have horns on their ears. It is not compensatory, for the ordinary horns of the animal are well developed ; we have no reason to believe it could have been produced to meet a physiological emergency. It might have been a horn the skin to form which had accidentally before birth become transferred by grafting from the frontal region to an ear resting against it, but in that case the ordinary frontal horn should be deficient or defective, which is not the case. Loose frontal horns of cattle are very common, especially in the more improved breeds and in females, rather than males, the core of the horn then degenerates at its root into a simple ligament or disappears altogether, and the organ may be far detached from its normal position. We have no evidence of such being the case here, but the reverse, for the ordinary horn occupies the usual position. We are thus, by exclusion, compelled to fall back on the view that we have to deal with a keratoma or horn tumour, an epidermal growth assuming the form of a conical horn. I have found recorded among my notes a case of “a horn on the tip of a cow’s ear,” as described by a professional friend of mine who saw the animal alive, which probably was of the same nature as this. Warts on the ears of cattle are by no means rare and keratoid growths are often dealt with in works on surgery and of the skin. Bland Sutton has recently brought out an interesting paper on the subject in the *Journal of Comparative Medicine and Surgery*.

NOTES ON THE FOOD OF THE PANTHER (*FELIS PARDUS*).

The following notes on the food of the panther may be of interest :—

When walking through a jungle in the district of Canara I came upon the fresh tracks of a panther, and following these tracks a short way, I found some fresh panther's droppings, embedded in which were the remains of a large black scorpion. It was evident from the way in which the scorpion's remains were embedded in the droppings that the panther had eaten and partly digested the scorpion.

On another occasion I had a chance of noting the food of panthers. A male panther was shot measuring 7 feet from the tip of nose to end of tail, while the girth measurement behind the fore legs was less than that of another panther, a cub, measuring something under 6 feet. The panther was in miserable condition, the cause of which seems to have been the presence of three porcupine's quills embedded in his body. Of these quills one was in the ball of the right forefoot, one a short distance up the left fore leg, and the third between the ribs close behind the shoulder. The quills were all broken, a length of about 3 inches remaining in the wounds. Around each wound the flesh was much inflamed. Panthers will also eat rats, and are very quick at catching them, which they do with both mouth and paws.

H. S. WISE.

NOTES ON THE CHEETAL.

A Poona correspondent wrote to us as follows, in July last :—

"I have a few Cheetal, or Spotted Deer (*Axis maculatus*), in an enclosure in my garden, very tame, and they breed regularly. A stag fawn was born in the month of May last, and, with its dam and companion, would come up and literally beg, rising on its hind legs for bread, biscuits and vegetables, offered by any visitor. Last week the river rose, the banks fell, and it became necessary to remove the deer from their enclosure to my stables. The fawn followed its dam, being let out of its enclosure, when something startled the little fellow and he jumped into the raging stream just opposite the Boating Terminus called *Rosherville*. Carried off his legs he swam vigorously across, and so far as we could see landed about a quarter of a mile below on the *Rosherville* bank. It was sundown, and we gave the animal up as lost. All we could do was to send round and warn the villagers and police. In the middle of the night, I heard the dam calling, and in the morning learnt that our little friend, who must have gone right up to Holkar's Bridge for the purpose, had swam across, about 2 a. m., and joined his mother, to the great alarm of the sentries, who thought it was a panther visiting them.

PROCEEDINGS OF THE MONTHLY MEETING HELD ON 4TH JULY 1887.

The Hon. Mr. Justice Birdwood presided.

The following new members were elected:—H. H. Prince Joravarkhanji of Bajana, Mr. E. von Hantelmann, Dr. W. Kay, Mr. A. C. Walker, Mr. F. E. Dempster, Mr. F. L. Charles, C.S., Mr. W. N. Fleming, Capt. E. G. Reilly, Mr. C. F. Whyte, Mr. G. de Soane, Mr. G. Sutton Jones, Capt. Pentland, Capt. Butler, and Mr. A. de Gama.

CONTRIBUTIONS TO THE SOCIETY'S COLLECTIONS.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections since the last meeting:—

Contribution.	Description.	Contributor.
2 Tigers' Skulls	<i>Felis tigris</i>	Capt. T. Macpherson.
1 Panther's Skull	<i>Felis pardus</i>	Do.
1 Snake (alive)	<i>Dendrophis picta</i>	Mr. F. Glendow.
1 Snake (alive)	<i>Zamrus fasciolatus</i>	Mr. T. Macleurean.
1 Snake (alive)	<i>Dipsos gokool</i>	Mr. M. C. Turner.
1 Black Bear (alive)	<i>Ursus labiatus</i>	Mr. A. C. Walker.
2 Field Mice	<i>Golunda ellioti</i>	Mr. F. Glendow.
1 Four-horned Antelope ..	<i>Totraceros quadricornis</i> ..	Victoria Gardens.
A quantity of Insects	From Belgaum	Mr. H. E. Andrewes.
1 Snake (alive)	<i>Python molurus</i>	Mr. C. F. G. Lester.
1 Pintail Grouse (alive) ..	<i>Pterocles alchata</i>	Do.
A quantity of Butterflies ..	From Raipur, C. P.	Mr. J. A. Betham.
1 Panther	<i>Felis pardus</i>	Victoria Gardens.
1 Snake	<i>Gongylophis conicus</i>	Capt. J. B. Peile.
1 Snake	<i>Lycodon anlicus</i>	Do.
A quantity of Butterflies ..	From Ceylon	Mr. A. P. Green.
Birds' Eggs and Nests ..	From Sangor, C. P.	Lieut H. E. Barnes.
1 Snake	<i>Onychocephalus acutus</i> ..	
1 Spotted Owlet (alive) ..	<i>Catiao brama</i>	Mr. H. Johnston.
A large piece of Coral ..	From the Red Sea	Mr. M. H. Starling.
2 Snakes	<i>Naga tripudians</i>	Mr. F. Kirby.
1 Black Buck	<i>Antelope bezoartica</i>	Victoria Gardens.
86 Birds' Skins	From Cutch	H. H. the Rao of Cutch.
1 Crested Serpent Eagle ..	<i>Spilornis cheela</i>	Mr. W. F. Sinclair, C. S.
1 Jungle Cat's Skin	From Alibag	Do.
1 Chinkara ..	<i>Gazella benonetti</i>	Mr. E. von Hantelmann.
1 Snake	<i>Bungarus arcuatus</i>	Capt. J. B. Poile.
1 Fetus of Black Buck ..	<i>Antelope bezoartica</i>	Do.
1 Skull of Black Bear	<i>Ursus labiatus</i>	Dr. Bridges.
A quantity of Reptiles ..	From Upper Burmah	Signor L. Tea.
A Skin and Skull	Of Black Panther	Col. W. Peyton.
A curiously deformed Hind Foot.	Of Black Buck	Mr. R. A. Straw.
1 Snake	<i>Echis carinata</i>	Mr. E. von Hantelmann.
Fossil Tooth of a Mastodoc ..	From Bhownuggor	H. E. the Lady Reay.
A number of other Fossils ..	Do.	Do.
1 Lizard	<i>Sitana minor</i>	Father Dreckmann
A number of Marine Animals.	From the Mergui Archipelago.	Mr. F. J. Daley.
2 Snakes	<i>Bungarus arcuatus</i> and <i>Dipsos gokool</i> .	Mr. T. Bromley, Jun.
1 Lizard	<i>Eublopharis hardwickii</i> ..	Lieut. H. E. Barnes.
1 Stuffed Albatross	Mr. C. F. Davur.
A quantity of Snakes' Eggs	<i>Tropidonotus quineunciatus</i> .	Mr. Thos. Hayter.
3 Sketches of the Talipot Palm.	<i>Corypha umbraculifera</i> ..	Mr. T. A. Le Mesurier
1 Goat's Head	With a 5 in. horn on tip of the ear.	Col. J. Biddulph.
1 Skin of Spotted Deer ..	<i>Axis maculatus</i>	Mr. E. von Hantelmann.
A fine Specimen of Coral ..	From the Red Sea	Mrs. Goldwyer Lewis.
1 Golden Pheasant (alive) ..	From Shanghai	Mr. Thos. Lang.
13 Birds' Skins	Do.	Mr. A. J. M. Inverarity.
1 Musk Deer's Skull	Do.	Do.
1 Turtle (alive)	<i>Cuonua olivacea</i>	Mr. W. F. Sinclair, C.S.
1 Python (alive)	<i>Python molurus</i>	Father Dreckmann
1 Sooty Tern	<i>Sterna fuliginosa</i>	Mr. W. F. Sinclair, C. S.
1 Striped Hyena	<i>Hyena striata</i>	Victoria Gardens.
1 Black Buck's Head ..	Horns, 24 inches	M. T. Le Mesurier.

Contribution.	Description.	Contributor.
1 Panther's Skull	Felis pardus.....	Mr. G. F. Blackwell.
A quantity of Snakes	From Pindi and Lahore...	Major Yerbury, R.A.
2 Hedgehogs (alive)	Erinaceus collaris	Do.
1 Spotted Hyæna's Skull	From Somali Coast	Lt. H. G. Swayne, R.E.
A quantity of Snakes and Fish.	From Aden	Capt W. Aves.
A quantity of Shells.....	From Perim Island.....	Do.
Skull and Horns of Oryx...	From Somali Coast.....	Do.
A quantity of Sea Snakes and other Marine Animals.	From Persian Gulf.....	Capt Bishop.
2 Avocets.....	Recurvirostra avocetta ...	Mr. E. F. Ansell.
1 Slender Loris	Loris gracilis	Victoria Gardens.
1 Snake	Bungarus arcuatus	Mr. John Fleming.
6 Birds' Eggs	From Yereand.....	Mr. Wm. Mahon Daly.
A number of Fish and Marine Animals.	From Alibag	Mr. W. F. Sinclair, C. S.

CONTRIBUTIONS TO THE LIBRARY.

Manual of Scientific Terms (Stormonth), by Mr. F. Gleadow.

Magazine of Natural History, Vol. 19, Nos. CXII. to CXIV, by Mr. H. Littledale.

Vertebrate Zoology of Sind (Murray), by Mr. E. S. Johannes.

Insect Transformation, by Major Yerbury, R. A.

Entomologist's Text Book (Westwood), by Major Yerbury, R. A.

Papillons Exotiques (Cramer), by Major Yerbury, R. A.

Monograph of the Callidryas (Butler), do.

Transactions of the Zoological Socy. for 1886, do.

Reise in Nordost Afrika (Honglin), do.

Bulletin of American Natural History, Vol. I. No. 8 (in exchange).

Buffon's Natural History, by Mr. J. A. Betham.

Records of the Geological Survey (in exchange).

Minor contributions received from Mr. A. S. Panday, Mr. E. Wylie, Mr. A. S. M. Ritchie, Mr. Kirby Johnston, Mr. Geo. Ormiston, Mr. J. Leask, and Mr. E. Calthrop.

Mr. J. H. Steel read a note on the head of a domestic goat which had a large cutaneous horn on the ear, received from Col. J. Biddulph. This note will be found in Zoological Notes, on page 283 in this number, which also contains a sketch of the head.

He also read a note on a deformed hoof of a Black Buck received from Mr. B. A. Straw, appearing under Zoological Notes.

Mr. Steel made the following remark—

ON THE DEFORMED CANINE TOOTH OF A TIGER.

Here we have in a tiger's skull, exhibited by Mr. G. Sutton Jones, of Deoli, another illustration of the effects of injuries on wild animals. I take it that a considerable time ago this tiger broke his canine tooth off rather short and had a very bad tooth-ache as a result. We can see the surface of the fracture although it had been smoothed off at the edges by friction during the long period since the original injury. We can also see that after the injury the tooth grew thicker than is natural, less smooth, and regular, and the tooth socket became enlarged and the bones around it swollen. These are indications that both the tooth-producing membrane and the bone near it were inflamed. Gradually, since this disease subsided, there

has been a return to normal conditions, yet even now the socket is larger and not quite the shape of its fellow, the bone around it is swollen, and the canine tooth is very different in appearance from an uninjured one although certainly more formidable to the eye and probably little less efficient for use.

Dr. Kirtikar, in referring to Mr. Steel's paper on the adventitious horn from the ear of a goat, said that in his opinion Mr. Steel's remarks regarding its origin were correct. The growth was of epidermal origin—arising from the layer of cells covering the true skin. There was a specimen of such a growth occurring in human beings in the Museum of Grant Medical College. The growth was shown as distinctly horny in one of Tuson's wax models which adorn the College Museum. Whether Tuson prepared it from an actually living specimen, or whether it was merely diagrammatic, he was not prepared to say. It was on the back of the forearm, just a little above the wrist joint, and appeared to be of epidermic origin. That such errors of nature have the horny element in them is undoubted. It was merely a modified form of the epithelial tissue.

VEGETABLE LIFE IN VEHAR WATER.

Dr. Kirtikar next showed under the microscope two specimens of algæ from Vehar water. One of them was the *Pleurococcus plurialis* and another contained the *Protococcus plurialis* and a minute variety of *Nostoc*. They were both magnified five hundred times.

During the course of his observations Dr. Kirtikar remarked that the first specimen of *Pleurococcus plurialis*, Fig. 4, Pl. II., was obtained from the Vehar pipe in the Jamsetji Jijibhai Hospital. It first appeared soon after the first fall of rain in Bombay and its suburbs, and has been since seen floating as green matter in the water served at the Jamsetji Hospital through the Vehar pipes. Whether the plant came from the Vehar Lake itself as a fresh growth from old plants, or whether the rainfall had introduced it afresh, or whether it was from the special pipe of the hospital, he was not prepared to say. He had just been kindly promised by Dr. Weir, who was then among the members present, that a supply of water direct from the Vehar Lake would be submitted to him for a further microscopical examination, to elucidate that point. The algæ, Dr. Kirtikar observed, were visible to the naked eye as irregular floating green masses. Under the microscope their full structure was apparent. Beautiful green masses, circular, but some hexagonal by pressure, covered over with a fine hyaline coating congregated in masses, hence being called "pleurococci," containing gonidia, in the shape of brilliant green granular matter. The masses were like "families" collected, and held together by a hyaline mass of cellular matter, distinct and irregular in shape. There was some among the individual pleurococci which were like the figure eight distinctly showing the process of multiplication by fission—one cell dividing into two, each of these again sub-dividing further. In the condition of the plant the present gonidia had not separated or escaped from the teguments, so it was not possible to determine whether the gonidia were ciliated or not.

With regard to the next specimen Fig. 5, Pl. II., Dr. Kirtikar observed that he had searched through the illustrations of Kützinger, the German Algologist, and through the plates recently published by Cooke; but that he had failed to find such minute arrangement of cells forming the filaments of the *Nostoc*. The protococcus which was seen in the field of the specimen was a variety of the ordinary *protococcus plurialis*, but the *Nostoc* was of a rare beauty and structure. It did not come direct from the Vehar

water, but was found growing along the sides and bottom of a bottle in which Vehar water had been stagnant for some days. The bottle was originally clean and the water was used for wetting postage stamps. Where the plant came from it is difficult to say. The *trichome* (filament formed from a stringed arrangement of minute unilocular cells—green in colour) was included in a very fine sheath, highly transparent. The filaments were not branched. The extreme minuteness of it was the point of interest about it, so that the Vehar Lake was not only important in its being a good supplier of excellent water, but that it was of interest to the man of science also.

Dr. Weir thanked Dr. Kirtikar for his contribution and expressed a hope that it would not be his last microscopic examination of Vehar water, but that from time to time he would give the Society the advantage of his repeated examinations.

The Hon'ble Mr. Birdwood concurred.

PROCEEDINGS OF THE MONTHLY MEETING HELD ON 1ST AUGUST 1887.

Dr. Kirtikar presided.

The following new members were elected :—Mr. Arthur Crawford, C.S., Mr. H. R. King, Captain M. J. Meade, Mr. B. Robertson, C.S., and Mr. R. A. Straw.

Mr. H. M. Phipson, the Honorary Secretary, acknowledged the following contributions to the Society's collections :—

Contribution.	Description.	Contributor.
1 Water Tortoise	From Persian Gulf.....	Mr. H. B. Hooper.
A number of Hemipterous Insects.	From Belgaum.....	Mr. H. E. Andrewes.
1 Chameleon	Chameleo vulgaris	Mr. J. C. Burke.
1 Snake (alive).....	Dipsas gokool	Mr. J. Fleming.
Foetus of Goat	Curiously deformed.....	Dr. T. Weir.
1 Lizard (alive).....	Varanus draccena.....	Mr. Alfred Walker.
1 Snake's skin	Python reticulatus from Mergui Archipelago	Messrs. Searle, Lamb, and Pickard.
2 Crocodiles (alive)	Crocodylus palustris.....	Mr. E. P. Close.
3 Jerboa Rats (alive)	Do.
1 Lemur	Sergt-Major Webb.
A quantity of Fish and Marine Animals.	From Alibag.....	Mr. W. F. Sinclair, C.S.
49 Birds' Skins	From Cashmere	Captain J. B. Peile.
A quantity of Reptiles.....	Do.	Do.

Mr. J. H. Steel, A.V.D., then read a very interesting paper on Wild Horses, which will be found on page 253 in this number.

Dr. Kirtikar proposed a vote of thanks to Mr. Steel for his able paper.

PROCEEDINGS OF THE MONTHLY MEETING HELD ON 5TH SEPTEMBER 1887.

Dr. D. Macdonald presided.

The following new members were elected :—H. H. the Thakore Saheb of Lathi, Mr. M. Scott Stuart, Mr. S. D. Sassoon, Dr. Anna Moreshwar Kunte, Veterinary Surgeon C. E. Nuthall, A.V.D., and Mr. N. Miller.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections since last meeting —

Contributions	Description.	Contributor.
4 Birds' Eggs.....	<i>Merula nigropileca</i>	Mr. J. Davidson, C.S.
5 Sea Snakes.....	From Bombay Harbour ...	Capt. W. Aves.
1 Pangolin (alive).....	<i>Manis pentadactyla</i>	Mr. H. M. Phipson.
12 Fossils	From Raipur C. P.....	Mr. J. A. Betham.
1 Fœtus of a dog	Curiously deformed.....	Mr. R. Tarkhad.
1 Peacock	Mounted	Dr. Kirtikar.
A quantity of Fungi.....	From Bombay	Do.
A quantity of Fish, Shells, Corals & other Marine Animals.	} From Alibag	Mr. W. F. Sinclair, C.S.
Skeleton of a Dolphin.....		
A quantity of Turtles' Eggs.	Do.	Do.
2 Muntjacs' Heads	<i>Cervulus aureus</i>	Do.
A number of Hermit Crabs.	From Aden	Mr. D. Bennett.
2 Flying Squirrels.....	From Cashmere	Capt. F. B. Peile.
24 Birds Eggs	Do.	Do.
1 Snake	<i>Bungarus arcuatus</i>	Dr. Hojel.
1 Sea Snake	<i>Enhydrina bengalensis</i> ..	Mr. F. Grievos.
1 Gibbon	Victoria Gardens.
Several Bats	<i>Megaderma lyra</i>	Mr. W. F. Sinclair, C.S.
1 Domestic Duck (alive) ...	With curiously deformed feet.	Mr. H. Bulkley.
1 Mongoose (alive)	<i>Herpestes griseus</i>	Mr. W. W. Saunders.
1 Manura	<i>Paradoxurus musanga</i> ...	Mr. E. P. Close.

Minor Contributions.—From Mr. Fraser Hore, Miss Warner, Mr. J. Greenwood, Dr. Weir, Mr. G. H. Colomb.

Contributions to the Library.—Journal of Comparative Medicine and Surgery, from the editor, "Verhandlungen des Zoologisch Botanischen Gesellschaft in Wien," in exchange.

Mr. H. M. Phipson, the Honorary Secretary, then read a paper on the "Poisonous Snakes of Bombay," which will be found on page 244 of this number.

The Rev. Fr. Dreckmann, S.J., made some remarks about the distinction of the poisonous from the non-poisonous snakes. He first drew attention to the erroneous but widely spread opinion that all poisonous snakes have a broad triangular head and a slender neck. This was, no doubt, a characteristic of the viperine snakes, but they had it in common with the perfectly harmless tree-snakes, whilst the Elapidae, which include the most deadly snakes in existence, in this respect looked very innocent. The list of poisonous land snakes in the Bombay Presidency, about which there could be any doubt, was happily a very short one. There could be no difficulty about the cobra or the rare *Ophiophagus*. The two species of *Callophis* were so rare, led such an obscure underground life, and were so sluggish, that it was practically impossible to be bitten by them accidentally. For the others, the *Bungarus*, the *Vipers* and *Tree-vipers*, he proposed the following "rule-of-thumb":—

1. *Head broad, triangular and very distinct from neck.*—(a) Those with head covered with large shields or plates are harmless. (b) Those having the head covered with small scales are poisonous.

2. *Head scarcely distinct from neck.* (a) Head covered with large shields and sub-caudals (shields beneath the tail) single, poisonous. (b) Either head covered with

shields and sub-caudals double or head covered with scales and sub-caudals single harmless.

Dr. K. R. Kirtikar read a paper on the "Indian Hepaticæ," which is printed on page 250 of this number.

Dr. Macdonald, in proposing a vote of thanks to Mr. Phipson for his very interesting paper on the poisonous snakes, remarked as to the extreme practical importance of the subject. With reference to Dr. Kirtikar's note, he observed that much new matter had been clearly put together and well observed facts had been given, and that it rested with the members of the Society interested in the subject of Botany to still further investigate the subject.

A vote of thanks was proposed to Dr. Kirtikar for his contribution, after which the meeting dissolved.



The Eggs, Caterpillar and Chrysalis of
HESTIA MALABARICA.

PLATE I.

FIG. I.



Normal size
Riccia No. 1
variety?



Fronds
magnified $\times 50$



Brown Spores
 $\times 500$

FIG. II.



Normal size
Riccia var. ? No. 2.
Tile-arrangement of fronds



Circular frond-arrangement



a. Enlarged lobule $\times 500$
b. Stomata of Riccia No. 2.
c. Polygonal cells with chlorophyll granules.



PLATE II.

FIG. III.



Normal size
Rivina No. 3. var. ?



Polygonal
cells

One of the lobules
enlarged $\times 500$
with chlorophyll granules.

ALGAE FROM VENAS WATER 1887.

FIG. IV.



Flavescens Venas.
in mass $\times 500$

FIG. V.

Scutell Minima
 $\times 500$



Flavescens Venas
 $\times 500$